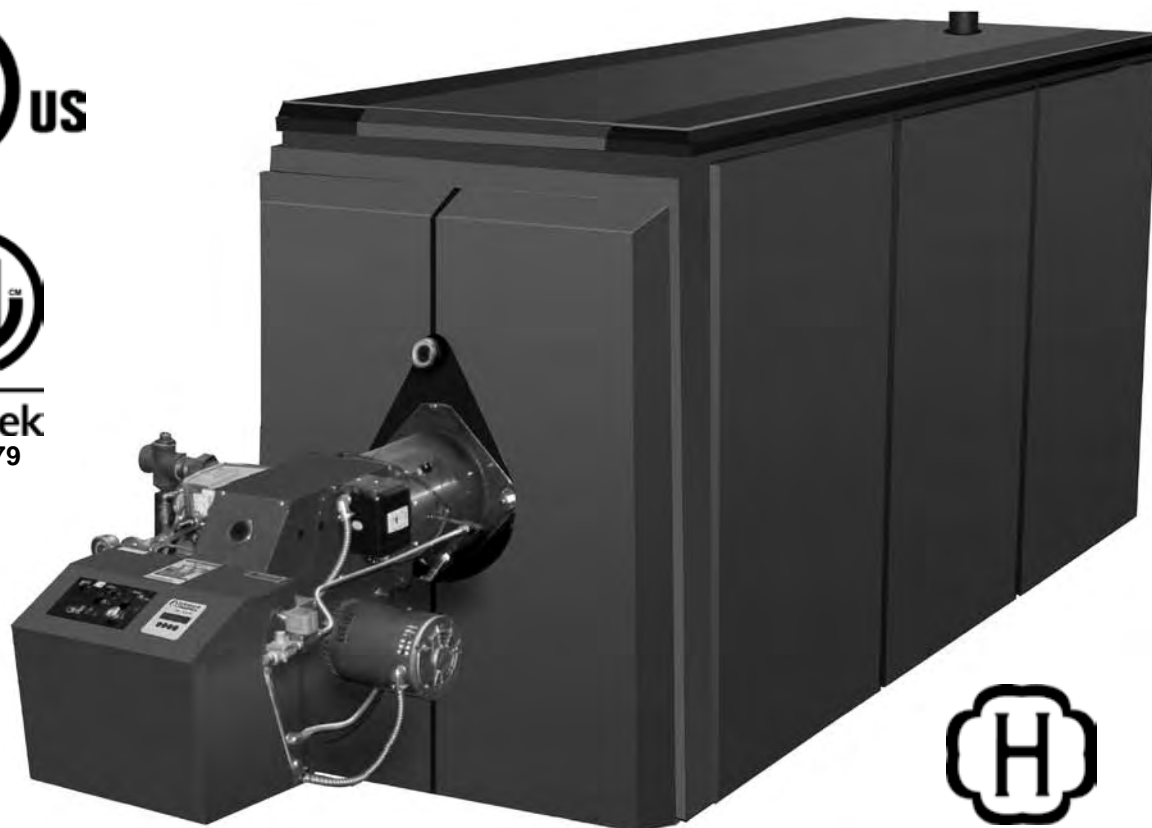


INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS FOR

Model MPC™ MULTI-PASS COMMERCIAL CAST IRON BOILER



Intertek
3050579



For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number _ - MPC _ _ - _ _ _ _	Boiler Serial Number	Installation Date
Heating Contractor		Type of Fuel
Address		Phone Number



www.burnhamcommercialcastiron.com

101786-01R5-11/10

Price - \$5.00

EQUIPMENT CHECK LIST

NOTE: Only factory packaged and firetested units are eligible to bear the UL listing mark.

This Equipment Check List has been provided so that the Installer can determine if all parts have been provided for the boiler ordered. It covers standard equipment for Knockdown boilers, 4 thru 18 section models. Optional equipment ordered will be in addition to, or in lieu of, equipment shown below.

To simplify boiler assembly, instructions refer to carton designations located in box on Bar Code Labels, see Figure 1a. When instructed, locate and open specified carton. Some cartons use all contents immediately and others use parts throughout the assembly procedure until depleted.

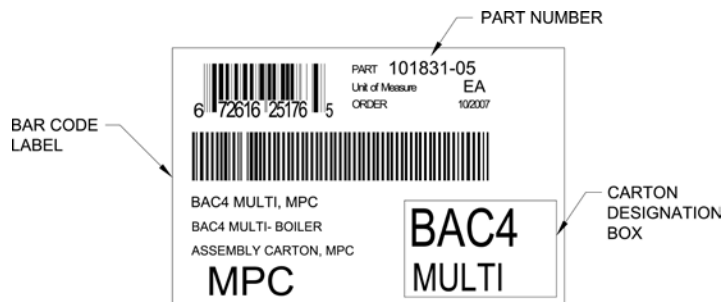


Figure 1a: Carton Identification

KNOCKDOWN BOILER - EQUIPMENT CHECK LIST																		
Component Description		Carton Designation on Bar Code Label	Part Number	Qty. Req'd. Per Boiler Size														
				4 Sect.	5 Sect.	6 Sect.	7 Sect.	8 Sect.	9 Sect.	10 Sect.	11 Sect.	12 Sect.	13 Sect.	14 Sect.	15 Sect.	16 Sect.	17 Sect.	18 Sect.
Castings (Shipped Loose - Field Assembly)																		
MPC Common Castings & Parts Skid (Includes Front Section, Rear Section, Burner Swing Door Assembly, Rear Flue Collector and Miscellaneous Common Parts Carton)		CP-S	101829-01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Center Section - Machined [Quantity shown shipped on separate skid(s), Maximum 6 per skid]		MPC-C	100657-01	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Parts Cartons																		
Boiler Assembly Cartons		BAC4	101831-01	1				1	1				1					
		BAC5	101831-02		1					1				1				1
		BAC6	101831-03			1					1					1		
		BAC7	101831-04				1					1					1	1
		BAC4 Multi	101831-05					1					1	1	1	1		2
		BAC5 Multi	101831-06						1	1	1	1	1	1	1	1	1	2
Supply & Return Manifold Carton		S/RM CI	103818-01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Return Water Mixing Tube Cartons Restricted Clearance		RWMT 4 RC	102804-04	1														
		RWMT 5 RC	102804-05		1													
		RWMT 6 RC	102804-06			1												
		RWMT 7 RC	102804-07				1											
		RWMT 8 RC	102804-08					1										
		RWMT 9 RC	102804-09						1									
		RWMT 10 RC	102804-10							1								
		RWMT 11 RC	102804-11								1							
		RWMT 12 RC	102804-12									1						
		RWMT 13 RC	102804-13										1					
		RWMT 14 RC	102804-14											1				
		RWMT 15 RC	102804-15												1			
		RWMT 16 RC	102804-16													1		
		RWMT 17 RC	102804-17														1	
		RWMT 18 RC	102804-18															1
Jacket Frame Cartons	Jacket Frame (Front/Rear Rails)	JF-1	101834-01	1	1	1						1	1	1	1	1		
	Jacket Frame (Front/Center/Rear Rails)	JF-2	101834-02				1	1	1	1	1						1	1
	Jacket Frame (Center Rails)	JF-3	101834-03										1	1	1	1	1	1

(Continued)

KNOCKDOWN BOILER - EQUIPMENT CHECK LIST (Continued)																			
Component Description		Carton Designation on Bar Code Label	Part Number	Qty. Req'd. Per Boiler Size															
				4 Sect.	5 Sect.	6 Sect.	7 Sect.	8 Sect.	9 Sect.	10 Sect.	11 Sect.	12 Sect.	13 Sect.	14 Sect.	15 Sect.	16 Sect.	17 Sect.	18 Sect.	
Parts Cartons (Continued)																			
Heat Exchanger Insulation Bags	Complete Heat Exchanger Insulation Wrapper	CPHW 4	101835-04	1															
		CPHW 5	101835-05		1														
		CPHW 6	101835-06			1													
	Front Heat Exchanger Insulation Wrapper	FTHW 1	101849-01				1												
		FTHW 2	101849-02					1	1			1	1	1				1	1
		FTHW 3	101849-03							1	1					1	1		
	Rear Heat Exchanger Insulation Wrapper	RRHW 1	101850-01				1	1				1						1	
		RRHW 2	101850-02						1	1			1	1	1				1
		RRHW 3	101850-03									1					1		
	Center Heat Exchanger Insulation Wrapper	CTHW 1	101851-01										1	1				1	1
CTHW 2		101851-02													1	1	1	1	
Jacket Panel Cartons (4 Cartons Required per Boiler)	Jacket Common Panels (Front and Rear)	JC-1	101836-01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Jacket Uncommon Panels (Outer Top Panels, Tie Bars, Chaseway Channels & Internal Wiring Harness)	JC2- 4	101837-04	1															
		JC2- 5	101837-05		1														
		JC2- 6	101837-06			1													
		JC2- 7	101837-07				1												
		JC2- 8	101837-08					1											
		JC2- 9	101837-09						1										
		JC2- 10	101837-10							1									
		JC2- 11	101837-11								1								
		JC2- 12	101837-12									1							
		JC2- 13	101837-13										1						
		JC2- 14	101837-14											1					
		JC2- 15	101837-15												1				
		JC2- 16	101837-16													1			
		JC2- 17	101837-17														1		
		JC2- 18	101837-18															1	
	Jacket Uncommon Top Panels Cartons	JC3- 4	101838-04	1															
		JC3- 5	101838-05		1														
		JC3- 6	101838-06			1													
		JC3- 7	101838-07				1												
		JC3- 8	101838-08					1											
		JC3- 9	101838-09						1										
		JC3- 10	101838-10							1									
		JC3- 11	101838-11								1								
		JC3- 12	101838-12									1							
		JC3- 13	101838-13										1						
		JC3- 14	101838-14											1					
		JC3- 15	101838-15												1				
JC3- 16		101838-16													1				
JC3- 17	101838-17														1				
JC3- 18	101838-18																1		

(Continued)

KNOCKDOWN BOILER - EQUIPMENT CHECK LIST (Continued)																		
Component Description		Carton Designation on Bar Code Label	Part Number	Qty. Req'd. Per Boiler Size														
				4 Sect.	5 Sect.	6 Sect.	7 Sect.	8 Sect.	9 Sect.	10 Sect.	11 Sect.	12 Sect.	13 Sect.	14 Sect.	15 Sect.	16 Sect.	17 Sect.	18 Sect.
Parts Cartons (Continued)																		
(Continued) Jacket Panel Cartons (4 Cartons Required per Boiler)	Jacket Uncommon Side Panel Cartons	JC4- 4	101839-04	1														
		JC4- 5	101839-05		1													
		JC4- 6	101839-06			1												
		JC4- 7	101839-07				1											
		JC4- 8	101839-08					1										
		JC4- 9	101839-09						1									
		JC4- 10	101839-10							1								
		JC4- 11	101839-11								1							
		JC4- 12	101839-12									1						
		JC4- 13	101839-13										1					
		JC4- 14	101839-14											1				
		JC4- 15	101839-15												1			
		JC4- 16	101839-16													1		
		JC4- 17	101839-17														1	
		JC4- 18	101839-18															1
Flueway Baffle Cartons	Second Pass Flueway Baffle Cartons (Stainless Steel)	2FB-18	101840-01	1														
		2FB-24	101840-02		1													
		2FB-31	101840-03			1												
		2FB-38	101840-04				1											
		2FB-45	101840-05					1										
		2FB-51	101840-06						1									
		2FB-58	101840-07							1	1							1
		2FB-65	101840-08													1	1	
		2FB- 72	101840-09									1			1			
	2FB- 78	101840-10										1	1					
	Third Pass Flueway Baffle Carton (Cold Rolled Steel)	3FB	101852-01	1	1	1	1	1	1	1	1							
Water Trim and Control Cartons	30 PSI Water Trim & Control Cartons	WT30-A	101841-01	1	1	1												
		WT30-B	101841-02				1	1	1									
		WT30-C	101841-03							1	1	1	1	1	1	1		
		WT30-D	101841-04														1	1
	50 PSI Water Trim & Control Cartons	WT50-A	101853-01	1	1	1	1	1	1									
		WT50-B	101853-02							1	1	1	1					
		WT50-C	101853-03											1	1	1	1	1
	80 PSI Water Trim & Control Cartons	WT80-A	101854-01	1	1	1	1	1	1	1	1	1						
		WT80-B	101854-02											1	1	1	1	1
Flue Outlet Damper Carton - 7"		FODC7	102473-01	1	1													
Flue Outlet Damper Carton - 8"		FODC8	102473-02			1	1	1										
Flue Outlet Damper Carton - 10"		FODC10	102473-03						1	1	1							
Flue Outlet Damper Carton - 12"		FODC12	102473-04										1	1	1	1	1	

INSPECT SHIPMENT carefully for any signs of damage. All equipment is carefully manufactured, inspected and packed.

Our responsibility ceases upon delivery of Boiler to carrier in good condition. Any claims for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances or shortages will be allowed by Boiler Manufacturer, unless presented within thirty (30) days after receipt of equipment.

IMPORTANT INFORMATION - READ AND SAVE THESE INSTRUCTIONS FOR REFERENCE

All boilers must be installed in accordance with National, State and Local Plumbing, Heating and Electrical Codes and the regulations of the serving utilities. These Codes and Regulations may differ from this instruction manual. Authorities having jurisdiction should be consulted before installations are made.

In all cases, reference should be made to the following Standards:

USA BOILERS

- A. Current Edition of American National Standard ANSI/NFPA 31, "Installation of Oil Burning Equipment", for recommended installation practices.
- B. Current Edition of National Fuel Gas Code, NFPA 54/ANSI Z223.1.
- C. Current Edition of American National Standard ANSI/NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances", for venting requirements.
- D. Current Edition of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety Devices for Automatically Fired Boilers", for assembly and operations of controls and safety devices.
- E. All wiring on boilers installed in the USA shall be made in accordance with the National Electrical Code and/or Local Regulations.

CANADIAN BOILERS

- A. Current Edition of Canadian Standards Association CSA B139, "Installation Code for Oil Burning Equipment", for recommended Installation Practices.
- B. The equipment shall be installed in accordance with the current Installation Code for Gas Burning Appliances and Equipment, CSA B149, and applicable Provincial Regulations for the class; which should be carefully followed in all cases.
Authorities having jurisdiction should be consulted before installations are made.
- C. All wiring on boilers installed in Canada shall be made in accordance with the Canadian Electrical Code and/or Local Regulations.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury or property damage.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

NOTICE

Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

NOTICE

This boiler has a limited warranty, a copy of which is printed on the back of this manual.
It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is complete. The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.

DANGER

DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Failure to follow all instructions in the proper order can cause personal injury or death. Read and understand all instructions, including all those contained in component manufacturers manuals which are provided with the appliance before installing, starting-up, operating, maintaining or servicing this appliance. Keep this manual and literature in legible condition and posted near appliance for reference by owner and service technician.

This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual.

Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency.

All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler.

It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is completed.

Installation is not complete unless a pressure relief valve is installed into the specified tapping on the supply manifold located on top and at rear of appliance - See Section III, Paragraph R, Item 3 of this manual for details.

All boiler builds, except boilers bearing the UL Label, are suitable for installation on combustibile flooring. Do not install boiler on carpeting. Do not operate on floors where heat affected material is below.

Do not tamper with or alter the boiler or controls. Retain your contractor or a competent serviceman to assure that the unit is properly adjusted and maintained.

Clean boiler at least once a year - preferably at the start of the heating season to remove soot and scale. The inside of the combustion chamber should also be cleaned and inspected at the same time.

Have Burner and Controls checked at least once a year or as may be necessitated. Do not operate unit with jumpered or absent controls or safety devices. Do not operate unit if any control, switch, component, or device has been subject to water.

This boiler is designed to operate with lower return water temperatures and avoid thermal shock and accumulation of condensate if operated per the following criteria:

- **Minimum Return Water Temperature = 80°F**
- **Maximum Delta T Between Boiler Supply and Return = 80°F**
- **Minimum Supply Water Temperature = 130°F**

Continued operation beyond these limitations will result in sustained condensing within the combustion chamber and potentially reduce boiler longevity and may result in premature boiler failure through thermal shock.

WARNING

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause death or serious injury and which are known to the state of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the appliance.

This boiler contains very hot water under high pressure. Do not unscrew any pipe fittings nor attempt to disconnect any components of this boiler without positively assuring the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this boiler to prevent scald injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the boiler. This boiler contains components which become very hot when the boiler is operating. Do not touch any components unless they are cool.

This appliance must be properly vented and connected to an approved vent system in good condition. Do not operate boiler with the absence of an approved vent system.

This boiler needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air.

The interior of the venting and air intake systems must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. Clean and unobstructed venting and air intake systems are necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

This boiler is supplied with controls which may cause the boiler to shut down and not re-start without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.

This boiler is designed to burn No. 2 fuel oil only. Do not use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. Do not convert to any solid fuel (i.e. wood, coal). Do not convert to any gaseous fuel (i.e. natural gas, LP). All flammable debris, rags, paper, wood scraps, etc., should be kept clear of the boiler at all times. Keep the boiler area clean and free of fire hazards.

Always keep the oil supply valve shut off if the burner is shut down for an extended period of time.

Probe and float type low water cutoff devices require annual inspection and maintenance. Refer to instructions in Section VI, Paragraph C for inspection and cleaning instructions.

NOTICE

Model MPC cast iron boilers are designed, built, marked and tested in accordance with the ASME Boiler and Pressure Vessel Code, Section IV, Heating Boilers. An ASME Data Label is factory applied to each MPC jacket, which indicates the boiler Maximum Allowable Working Pressure (MAWP). Each cast iron section is permanently marked with the MAWP listed on the boiler's ASME Data Label. This value for the MPC is as follows:

MAWP, Water (USA and Canada) - 80 PSI

It is common and acceptable practice to install these boilers in lower pressure systems, below the boiler MAWP. Therefore, Burnham offers safety relief valves set at or below the MAWP of the boiler. See Page 12 for available safety relief valve set pressures.

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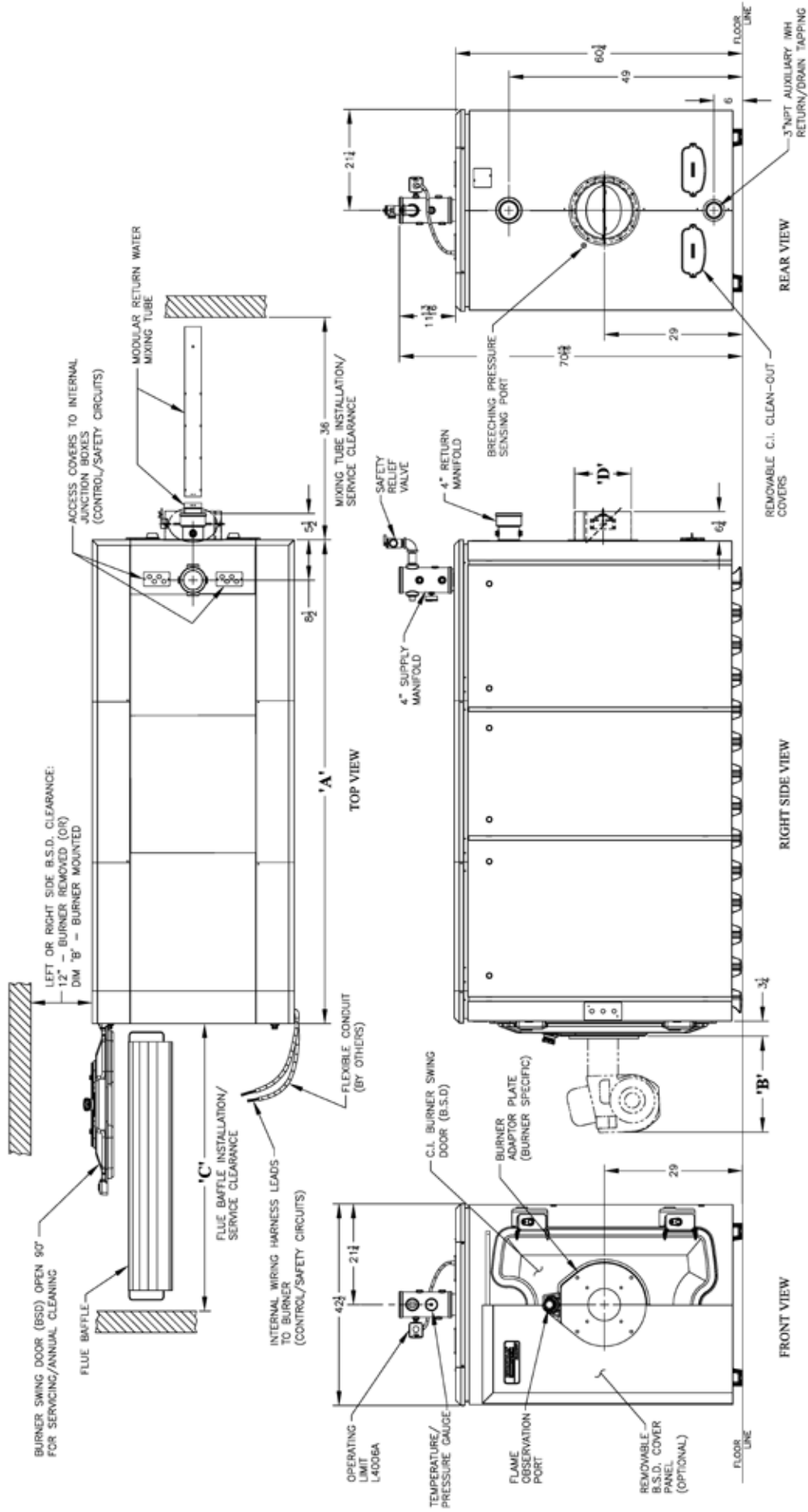
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WARRANTY.....	REAR COVER
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* Wiring harness shown in this location for illustration purposes - typically, wiring harness leads will exit jacket on same side as BSD hinges.

Figure 1b: Dimensional Information






SECTION I - GENERAL INFORMATION

Table I: Dimensional Information

Boiler Model	Number of Sections	Dim. A (Inches)	* Burner Dimension B (Inches)				Minimum Flue Baffle Installation Clearance Dim. C (Inches)	Vent (Flue Outlet Damper) Connection Size Dim. D (Inches)	Approx. Weight of Sections - LBS. (Block Assy.)	Approx. Shipping Weight - LBS. (KD Boiler)
			Beckett		Power Flame					
			CF	CG	C	JR				
MPC4	4	33-3/4	10-1/4	20-3/4	29-5/8	23	35	7"	1875	2370
MPC5	5	40-1/2	12-1/4	21-3/4	29-5/8	23	35	7"	2321	2821
MPC6	6	47-1/4	20-1/2	28-1/2	29-5/8	23	41	8"	2767	3272
MPC7	7	54	20-1/2	28-1/2	29-5/8	23	48	8"	3213	3733
MPC8	8	60-3/4	21	29	34-5/8	25-3/4	55	8"	3659	4194
MPC9	9	67-1/2	21	29	34-5/8	25-3/4	61	10"	4105	4655
MPC10	10	74-1/4	21	29	34-5/8	25-3/4	68	10"	4551	5116
MPC11	11	81	22-1/2	29	34-5/8	25-3/4	68	10"	4997	5577
MPC12	12	87-7/8	22-1/2	29-3/8	34-5/8	---	82	10"	5443	6073
MPC13	13	94-5/8	22-1/2	29-3/8	34-5/8	---	88	12"	5889	6544
MPC14	14	101-3/8	22-1/2	29-3/8	34-5/8	---	88	12"	6335	7015
MPC15	15	108-1/8	22-1/2	29-3/8	39-1/2	---	82	12"	6781	7486
MPC16	16	114-7/8	26-3/8	29-3/8	39-1/2	---	75	12"	7227	7957
MPC17	17	121-5/8	26-3/8	29-3/8	39-1/2	---	75	12"	7673	8438
MPC18	18	128-3/8	26-3/8	29-3/8	39-1/2	---	68	12"	8119	8919

* Burner control panel configuration may change this dimension.

TABLE II: RATINGS/DATA

<div>   </div> <div>Model MPC™ Boilers</div> <div>    </div>														
Boiler Model	Boiler Horsepower	Burner Input			Gross Output (MBH)	Net I=B=R Rating (MBH)	Combustion Efficiency		Heating Surface (Sq. Ft.)	Net Furnace Volume (Cu. Ft.)	Pressure in Firebox (Inches Wtr. Column)	Water Content (Gallons)	Boiler Weight w/Water (LBS.)	Vent (Flue Outlet Damper) Dia. (Inches)
		Oil (GPH)	Oil (MBH)	Gas (MBH)			Oil - %	Gas - %						
MPC4	12.7	3.55	497	500	424	369	89.0	86.3	75.0	7.1	0.10	63	2820	7
MPC5	19.5	5.50	770	773	652	567	88.8	86.1	95.3	9.1	0.19	78	3396	7
MPC6	25.0	7.10	994	995	837	728	88.7	86.0	115.5	11.0	0.28	93	3972	8
MPC7	30.6	8.70	1218	1216	1023	890	88.7	86.0	135.8	12.9	0.34	108	4558	8
MPC8	36.1	10.2	1428	1438	1209	1051	88.6	85.9	156.1	14.8	0.39	123	5144	8
MPC9	41.7	11.8	1652	1660	1395	1213	88.6	85.9	176.4	16.7	0.45	137	5721	10
MPC10	47.2	13.4	1876	1881	1580	1374	88.6	85.9	196.6	18.6	0.50	152	6307	10
MPC11	52.8	15.0	2100	2103	1766	1536	88.5	85.9	216.9	20.6	0.66	167	6893	10
MPC12	58.3	16.6	2324	2325	1951	1697	88.5	85.8	237.2	22.5	0.82	182	7489	12
MPC13	63.8	18.2	2548	2547	2137	1858	88.5	85.8	257.5	24.4	0.98	196	8077	12
MPC14	69.4	19.8	2772	2769	2322	2019	88.5	85.8	277.7	26.3	1.14	211	8673	12
MPC15	74.9	21.5	3010	2991	2508	2181	88.4	85.8	298.0	28.2	1.30	226	9269	12
MPC16	80.5	23.0	3220	3213	2694	2343	88.4	85.8	318.3	30.2	1.30	241	9865	12
MPC17	86.0	24.5	3430	3435	2880	2504	88.4	85.8	338.6	32.1	1.40	256	10470	12
MPC18	91.6	26.0	3640	3657	3065	2665	88.4	85.8	358.8	34.0	1.50	270	11068	12

(1) Suffix "N" indicates natural gas-fired, suffix "P" indicates LP gas-fired, "O" indicates oil-fired, "C" indicates combination natural gas/oil-fired, "D" indicates combination LP gas/oil-fired.

(2) I=B=R net ratings shown are based on 1.15 piping and pickup factor for water.

Consult manufacturer for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.

(3) The I=B=R burner capacity in GPH is based on oil having a heat value of 140,000 BTU per gallon.

(4) Boiler ratings are based on 13.2% CO₂ (oil) and 10.2% CO₂ (natural gas) and +.10" water column pressure at boiler flue outlet.

Ratings shown above apply at altitudes up to 1000 feet on oil and 2000 feet on gas. For altitudes above those indicated, the ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

Safety Relief Valve Set Pressure: Standard - 50 PSI; Optional - 30 PSI, 80 PSI

SECTION I - GENERAL INFORMATION (Continued)

A. INSPECT SHIPMENT carefully for any signs of damage.

1. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated Boiler to the carrier in good condition.
2. ANY CLAIMS for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within thirty (30) days after the receipt of goods.

B. LOCATE THE UNIT

NOTICE

Recommended clearance for service may be reduced to minimum clearance to combustible material. However, increased service and maintenance difficulty will result.

1. RECOMMENDED SERVICE CLEARANCE

- Locate the unit in the boiler room so as to provide ease of venting and adequate clearance for maintenance, serviceability, and installation of piping. Refer to Figure 1b and Table 1 for boiler dimensional data.

From Jacket Front Panel:

- Provide 54" service clearance for removal, maintenance, and servicing of burner and controls.
- Provide service clearance for removal of baffles to perform annual cleaning of flueways, refer to Table I, Dimension "C".

From Jacket Rear Panel:

- Provide a minimum service clearance from the boiler jacket for access to boiler supply and return piping, relief valve, drain valve, flue collector clean-out covers, vent piping and optional flue damper assembly. See Table III.

Table III: Recommended Rear Service Clearance

Flue Outlet Size	Combustible or Non-Combustible Surfaces
7" Dia.	36
8" Dia.	36
10" Dia.	36
12" Dia.	36

From Jacket Left Side Panel:

- Provide clearance per Table I, Dimension 'B', for burner swing door (BSD), opened fully with burner mounted, otherwise 12" with burner removed.
- 18" access clearance to service rear of boiler if right side clearance is less than 12".
- 12" minimum if right side clearance is 18" or larger to access and service rear of boiler.

From Jacket Right Side Panel:

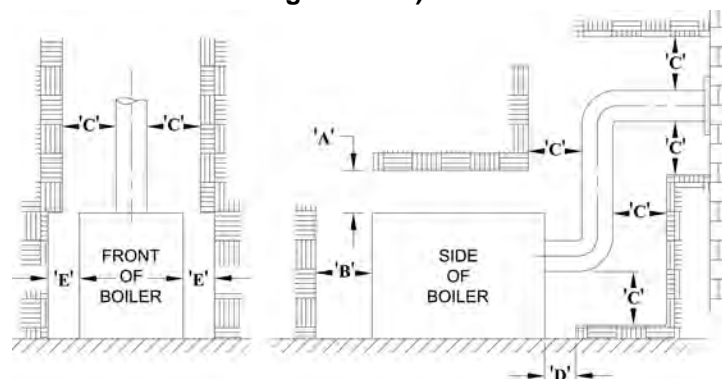
- See Table I, Dimension 'B' if BSD is hinged to swing to right side with burner mounted, otherwise 12" minimum if left side clearance is 18" or larger to access and service rear of boiler.

From Jacket Top Panel:

- Provide a minimum clearance from the boiler jacket of 24".

2. FOR MINIMUM CLEARANCES to combustible materials, See Table IV or Table V.

Table IV: Minimum Installation Clearances To Combustible Materials (Inches) per ANSI/NFPA 31 (Knockdown/Non-UL Packaged Boiler)



	A	B	C	D	E
Boiler	Above	Front	Chimney Connector	Rear	Sides
MPC	6	24	18	6	6

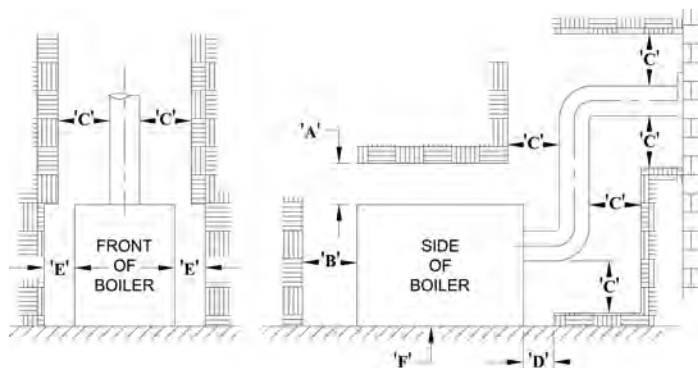
Note: See Table III for recommended service clearance to access rear of boiler.

NOTE 1: Listed clearances comply with American National Standard ANSI/NFPA 31, Installation of Oil Burning Equipment.

NOTE 2: MPC Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.

NOTE 3: For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 Standard.

Table V: Minimum Installation Clearances To Combustible Materials (Inches) per UL726 (Packaged / Firetested Boiler)



	A	B	C	D	E	F
Boiler	Above	Front	Chimney Connector	Rear	Sides	Below
MPC	18	48	18	18	18	NC *

* NC - Noncombustible Flooring

Note: See Table III for recommended service clearance to access rear of boiler.

NOTE 1: Listed clearances comply with UL 726, Standard for Oil-Fired Boiler Assemblies.

NOTE 2: MPC Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.

3. PROVIDE ADEQUATE FOUNDATION for the unit. Refer to Figure 2.

WARNING

All boiler builds, except boilers bearing the UL Label, are suitable for installation on combustible floor. Do not install boiler on carpeting.

Floor construction should have adequate load bearing characteristics to bear the weight of the boiler filled with water (see Table 1). A boiler foundation similar to the one shown in Figure 2 is recommended if the boiler room floor is weak or uneven or if a water condition exists.

4. PROVIDE AIR SUPPLY AND VENTILATION to accommodate proper combustion.

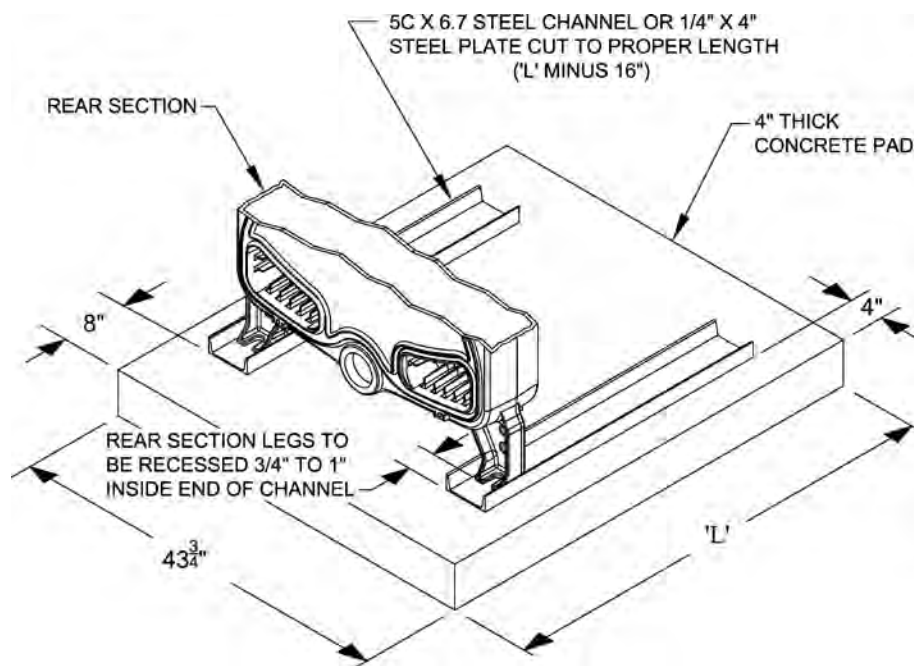
WARNING

Failure to supply adequate air to the boiler will result in unsafe boiler operation.

For commercial and industrial equipment, permanent facilities for supplying an ample amount of outside air shall be provided in accordance with the following.

For boiler rooms adjacent to outside walls, and where combustion air is provided by natural ventilation from the outside, there shall be a permanent air supply inlet having a total free area of not less than 1 sq. in. per 4,000 Btu per hr. (35 sq. in. per gal. per hr.) (5.5 cm² per kw.) of total input rating of the burner or burners and in no case less than 35 sq. in. (0.425 m²).

For boiler rooms not adjacent to outside walls, the combustion air shall be supplied in a manner acceptable to the authority having jurisdiction.



NO. OF SECTIONS	'L' CONCRETE PAD LENGTH
4	43-1/4
5	50
6	56-3/4
7	63-1/2
8	70-1/4
9	77
10	83-3/4
11	90-1/2
12	97-1/4
13	104
14	110-3/4
15	117-1/2
16	124-1/4
17	131
18	137-3/4

Figure 2: Boiler Foundation

- a. In the absence of local requirements, the confined space shall be provided with two permanent openings, one in or near the top of the room and one near the bottom. The openings shall communicate by means of ducts, with the outdoors or to such spaces (crawl or attic) that communicate with the outdoors.
 - i. Where communicating by means of vertical ducts, each opening shall have a free area of not less than 1 sq. in. per 4,000 Btuh (35 sq. in. per gph.) (5.5 cm² per kw) of total input rating of all appliances in the enclosure.
 - ii. If horizontal ducts are used, each opening shall have a free area of not less than 1 sq. in. per 2,000 Btuh (70 sq. in. per gph.) (11 cm² per kw) of total input of all appliances in the enclosure.

5. CHIMNEY OR VENT (Be sure to read below WARNINGS.)

The Model MPC™ Series boiler is designed for forced draft firing and may be used with a conventional natural draft stack (15' minimum height) or a stub vent, sometimes called a diesel stack (see Figure 3a). See Table I for the proper vent outlet size. For low silhouette vent terminations, see Figure 3b. Draft controls are not normally required, although they may be used on installations where a natural draft stack is used or on multiple boiler installations with a common stack. For proper operation, boiler must maintain positive pressure of 0.1" W.C. at the breech in the cast iron flue collector during burner high fire operation (see breeching pressure sensing port in Figure 1b). To obtain the above, a factory supplied MPC Flue Outlet Damper Assembly (see Page 56 for details) must be attached directly to the Rear Flue Collector Outlet.

If the venting system is designed for positive or forced draft venting, the boiler, vent connector and stack will operate under positive pressure. Gas tight vent systems designed for pressure systems must

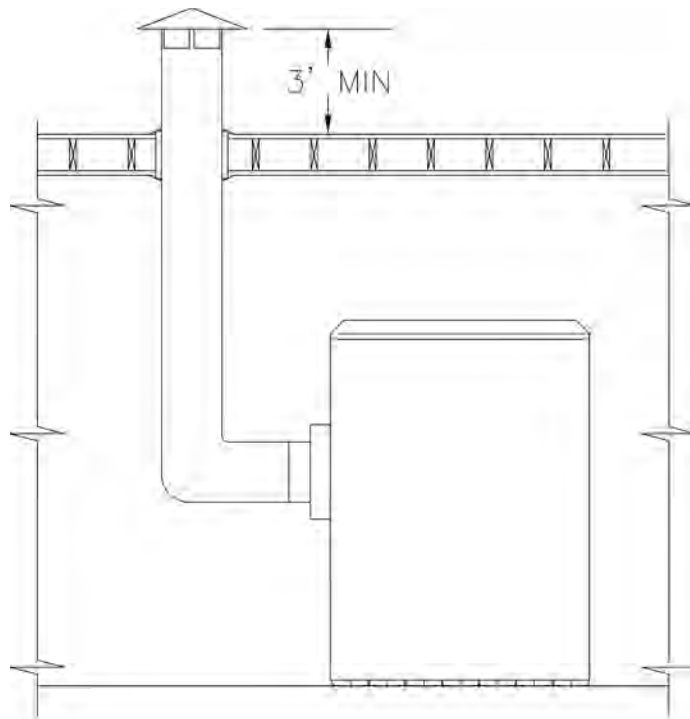


Figure 3a: MPC with Rear Outlet Vent

be used to prevent flue by-product leakage. The vent height is usually limited to prevent negative draft, typically three (3) feet above the roof line (see Figure 3a). The damper shall be adjusted to maintain a positive pressure of 0.1" W.C. at the flue outlet during burner high fire operation.

If the venting system is designed for negative pressure (natural draft), the boiler still operates with positive pressure in the chamber and up to the fixed damper on the flue collar. However, if the venting system is larger than what is required, the stack will provide a surplus draft (or negative pressure) that may require the use of a barometric damper to maintain the positive 0.1" W.C. pressure at the flue outlet. Multiple forced draft boiler stacks should always be designed as negative to ensure the products of combustion do not exit a boiler that is not firing.

NOTICE

When an MPC gas fired boiler is connected to a venting system that is designed so that it will operate under a negative pressure, the use of Type B, or other manufactured vent systems designed for negative pressure is acceptable.

When an MPC oil fired or combination gas/oil fired boiler is connected to a venting system that is designed so that it will operate under a negative pressure, the use of Type L or other manufactured vent systems designed for negative pressure is acceptable.

Unlined masonry chimneys are not acceptable. Lined masonry chimneys are acceptable with the appropriate vent connectors using materials described above.

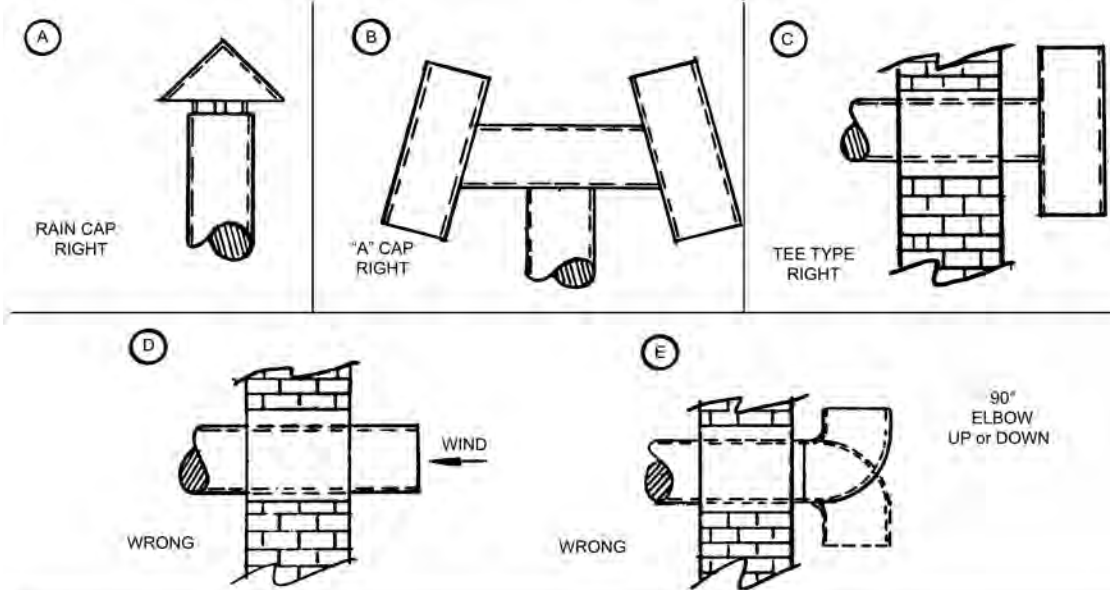
MPC oil or combination gas/oil boilers should be vented using Type L vent, regardless if the vent pressure is positive or negative.

WARNING

Single wall Type C vent material is not approved for MPC boiler venting. When an MPC gas fired boiler is connected to a venting system that is designed so that it will operate under a negative pressure, manufactured vent systems, designed and approved for positive pressure application per UL1738, must be used (for example, Van-Packer Model CS, Protech Model FasNSeal / FasNSeal W2, Heatfab Saf-T-Vent or equivalent).

When an MPC oil fired or combination gas/oil fired boiler is connected to a venting system that is designed so that it will operate under a positive pressure, manufactured vent systems, designed and approved for positive pressure application, must be used (for example, Selkirk Metalbestos Model PS/IPS, Van-Packer Model ES or equivalent).

Typical Vents that are used on Forced Draft Boilers, on Low Silhouette Buildings



VENT SIZING - Area must be the same as or greater than the boiler breeching (Smoke Outlet). A barometric damper may be required on installations with a high draft condition.

FAULTY BOILER BURNER OPERATION

1. If improper vent is suspected, remove pipe at breeching and operate boiler. This will determine if excessive down draft, blocked or restricted flue, etc. is causing the problem.
2. If using type shown in A above, be sure cap is raised sufficiently above main pipe to allow flue gases to vent unimpeded.
3. A popular type cap is shown in B.
4. The tee is frequently used as shown in C.
5. D and E should not be used due to possible fluctuations in back pressure.

Figure 3b: Vents - Faults and Suggestions

WARNING

Venting Instructions are recommendations only. Consult a venting expert on the design of a specific vent system for your application. The ASHRAE Venting Guide and The National Fuel Gas Code, NFPA 54 should be considered in all venting systems.

Conventional vent material may not be suitable for the application. Flue gases can leak carbon monoxide from the joints on these materials and can result in severe personal injury or death.

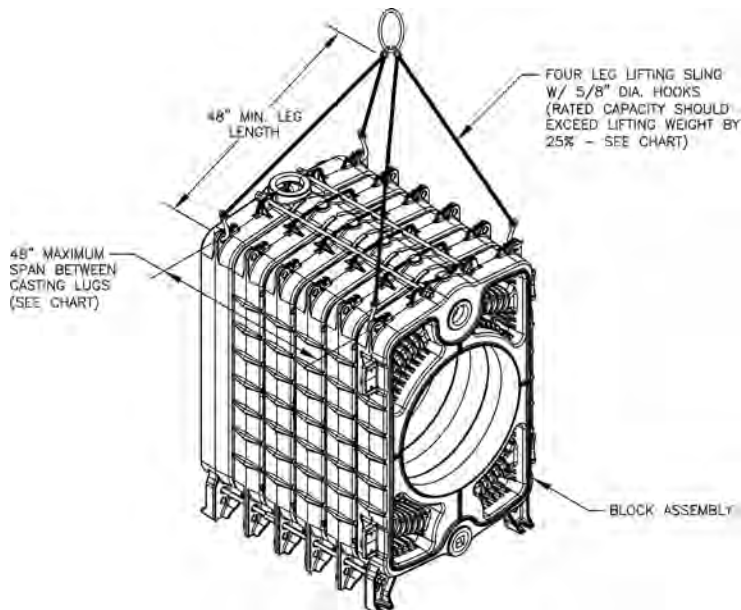
Installations having long horizontal runs or an excessive amount of tees or elbows will restrict the flow of combustion gases and can result in condensation, flue gas leakage of carbon monoxide, resulting in severe personal injury or death.

SECTION II - CAST IRON BLOCK ASSEMBLY INSTRUCTIONS (Knockdown Boilers)

NOTE: Only factory packaged and firetested units are eligible to bear the UL listing mark.

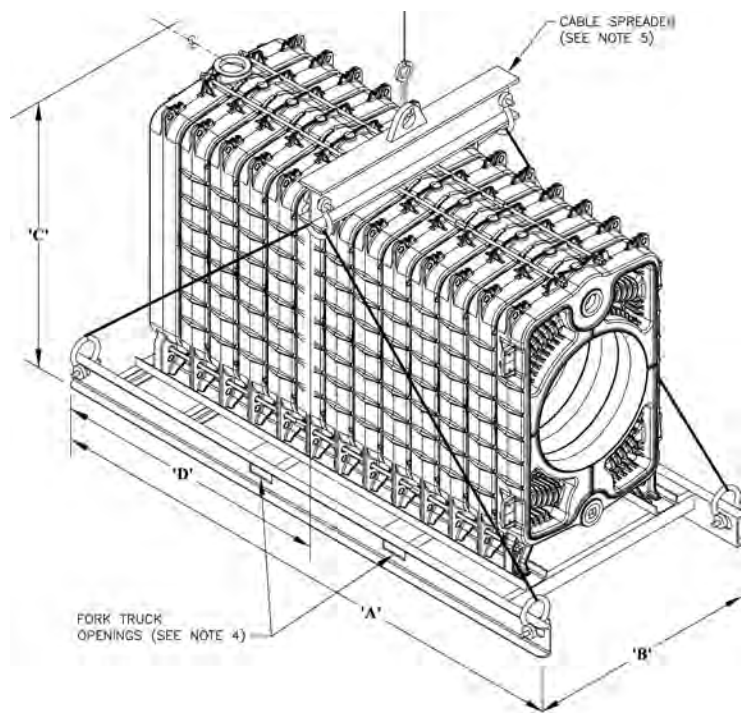
A. FACTORY ASSEMBLED SECTIONS - The assemblage should be set in the proper location as

outlined in Section I. Lifting arrangement and weights are given in Figures 4a and 4b.



Number of Sections	Lifting Weight (lbs)	Lift Locations	
		Hooks 1 & 2	Hooks 3 & 4
4	1875	Front	Rear
5	2321	Front	Rear
6	2767	Front	Rear
7	3213	Front	Rear
8	3659	Front	Rear
9	4105	Section 2	Rear
10	4551	Section 2	Section 9
11	4997	Section 3	Section 10
12	5443	Section 3	Section 10

Figure 4a: Lifting Instructions - Limited to 4 thru 12 Section Block Assembly (No Steel Base)



Optional Steel Shipping Base - 4 thru 12 Section Block

Number of Sections	Length A (Inch)	Width B (Inch)	Height C (Inch)	Approx. Center of Gravity D (Inch)	Approx. Shipping Weight (Lbs.)
4	51½	48	61½	23¾	2068
5	57½	48	61½	26¼	2546
6	63½	48	61½	29¼	3009
7	69¾	48	61½	32½	3488
8	76	48	61½	35½	3952
9	82	48	61½	38½	4415
10	94¼	48	61½	44½	4896
11	100½	48	61½	47¾	5360
12	106½	48	61½	50¾	5838

Standard Steel Shipping Base - 13 thru 18 Section Block

Number of Sections	Length A (Inch)	Width B (Inch)	Height C (Inch)	Approx. Center of Gravity D (Inch)	Approx. Shipping Weight (Lbs.)
13	112½	48	61½	53¾	6301
14	118¾	48½	63½	57	6805
15	125	48½	63½	60	7270
16	131	48½	63½	63	7734
17	137	48½	63½	66	8199
18	143¾	48½	63½	69¾	8663

1. Do not Tilt. Exercise caution when lifting to avoid damage.
2. This boiler can be lifted by fork truck. Do not truck from front.
3. When lifting from rear, forks must extend from beyond center of gravity and second skid cross bar.
4. When lifting from side, forks must extend to opposite skid rail and straddle center of gravity.
5. Cablespreader is to prevent casting damage. Spreader width should equal B (width of skid) +12". Adjust cable lengths to lift at approximate center of gravity per chart.

Figure 4b: Lifting Instructions - 4 thru 18 Section Block Assembly w/Steel Base

Then proceed to Step C of this section on Page 24, "HYDROSTATIC TEST".

B. FIELD ASSEMBLED SECTIONS - If the boiler was ordered knockdown, to be field assembled, follow the assembly procedure outlined on the following pages.

1. ASSEMBLY OF SECTIONS (MANUAL DRAW-UP)

These sections are designed to be drawn together one section at a time using the Manual Draw-up Kit (Burnham P/N 102008-01 or P/N 102008-02) using ordinary hand tools.

Tools required:

- (1) ¾" Drive Ratchet
- (1) 1¼" Socket
- (1) 1¼" Combination or Open End Wrench
- (1) Can Thread Cutting Oil or Grease

WHEN ASSEMBLING SECTIONS WITHOUT HYDRAULIC DRAW-UP EQUIPMENT, IT IS RECOMMENDED THAT ONE SECTION BE ASSEMBLED AT A TIME. NEVER ASSEMBLE MORE THAN TWO SECTIONS AT A TIME.

Assembly Procedure (refer to Figure 5 for Exploded View of Block Assembly and Draw-up Hardware):

Step a. Place the rear section in its approximate final position, as outlined in Section I. Stand rear section up and brace in vertical position with a suitable prop. See Figure 6.

Step b. Clean the rope groove around perimeter of the rear section with a wire brush.

Step c. Open the Boiler Assembly Carton(s), marked 'BAC' and remove contents. Separate the items by type. There are two (2) different pre-cut lengths of the red silicone coated fiberglass rope. The combustion chamber rope is 86" long and the perimeter rope is 164" long.

Step d. Using the multi-purpose spray adhesive provided, apply the adhesive to the perimeter rope groove. Follow the directions on the can for application and tack time. **GREAT CARE MUST BE TAKEN TO ENSURE THAT THE ADHESIVE DOES NOT COME IN CONTACT WITH THE MACHINED NIPPLE PORTS.**

Step e. While the adhesive is becoming tacky, clean the nipples ports and nipples thoroughly with a de-greasing solvent.

Step f. Locate a 164" length of silicone coated fiberglass rope and 10.3 oz. cartridge of RTV 6500 or RTV 736 Red Silicone Sealant. Starting at 3 o'clock position, push rope into groove and continue around perimeter until rope overlaps the starting point. Rope should be approximately

4" longer than required. Use a permanent black marker to mark the rope approximately 1/8" beyond point of overlap. Cut off excess with scissors or utility knife and wooden cutting block. Apply a generous bead of red sealant to both ends of cut rope, push ends together and smooth excess sealant over joint with your finger.

WARNING

Sealant must be properly applied to ALL boiler joints. Failure to properly seal the boiler joints will result in combustion gas leaks through the joint. DO NOT operate boiler with combustion gas leaks. The sealant should be applied before each section is placed on the assembly.

Step g. Use the Loctite #592 lubricant supplied to lubricate the nipples and nipple ports. Apply the lubricant to the nipples and nipple ports, then use a brush to disperse it evenly around the nipples and nipple ports. Use approximately 20 ml of lubricant per flueway [(1) 7" and (1) 3" nipple and their corresponding nipple ports - (2) in the rear section and (2) in the next adjoining section].

Step h. Drive nipples squarely into section using block of wood and hammer, or preferably, an aluminum head hammer. Burnham offers a polyethylene block for setting the nipples (part no. 8052601). Place block over entire nipple edge and hit the wood or polyethylene block with the hammer.

NOTICE

Nipples must be driven in evenly and to the proper depth to assure tight joints. Most nipple leaks are caused by tilted or cocked nipples.

DO NOT use steel/iron head hammer to drive nipples without using a wood or polyethylene block. Nipple damage may result.

Step i. A special nipple setting gauge is provided for the nipples. Gauge nipple at 90° angles to insure that it is driven to the proper depth into the nipple opening (nipple port). Cut-out in gauge must rest on nipple, with the legs of the gauge touching finished face of section, when nipple is properly driven. See Figure 7.

Step j. Apply a generous bead of RTV 6500 or RTV 736 sealant to the (4) flueway sealing grooves on rear section. Sealant should start against the rope gasket, run across the groove in one continuous bead, and end against rope gasket at the opposite side. Refer to Figure 5.

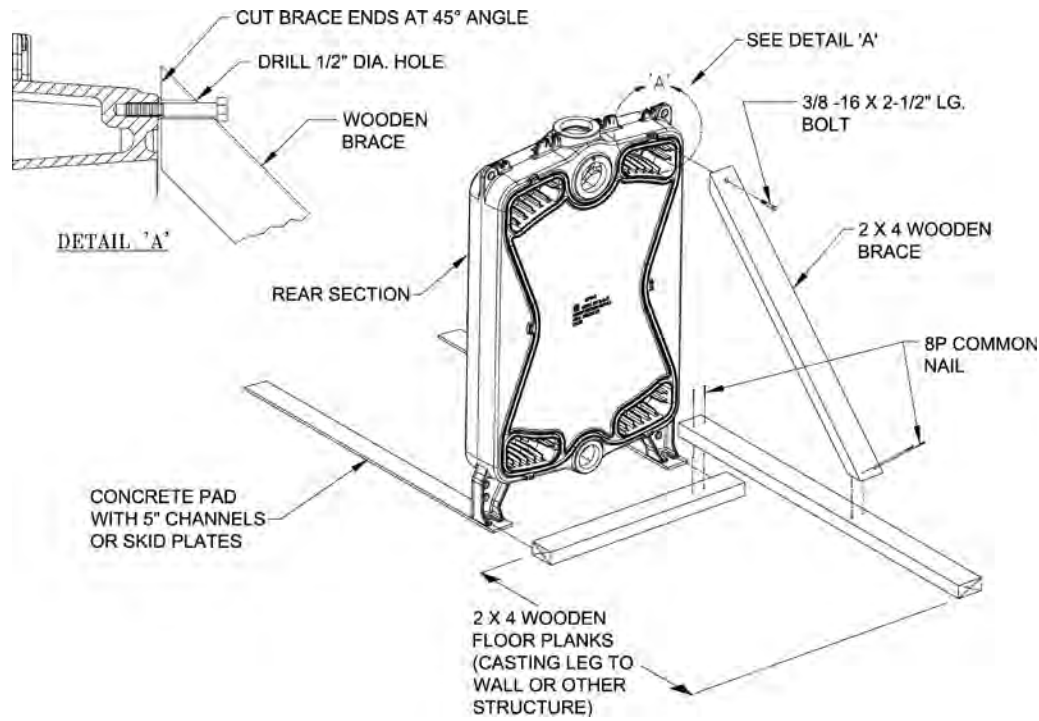


Figure 6: Vertical Bracing of Rear Section

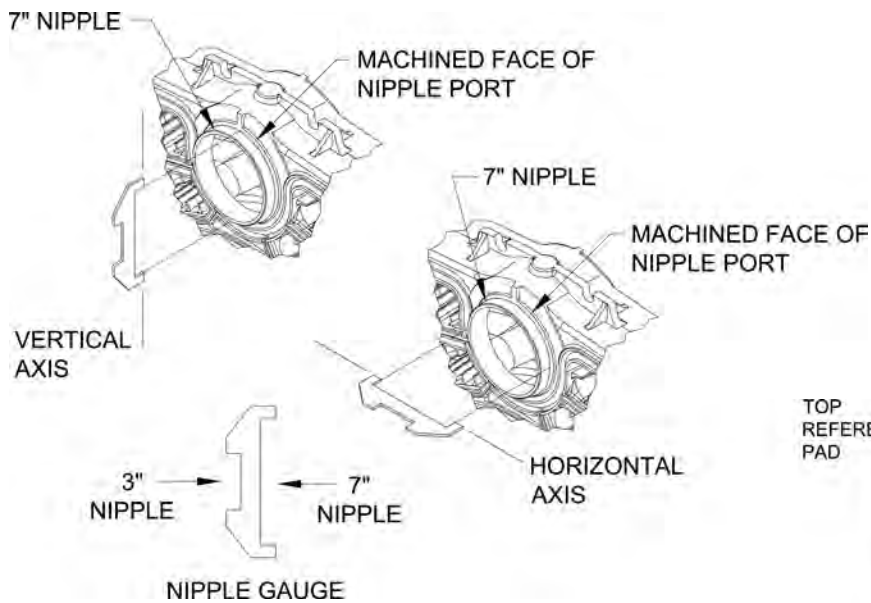


Figure 7: Setting of Nipples

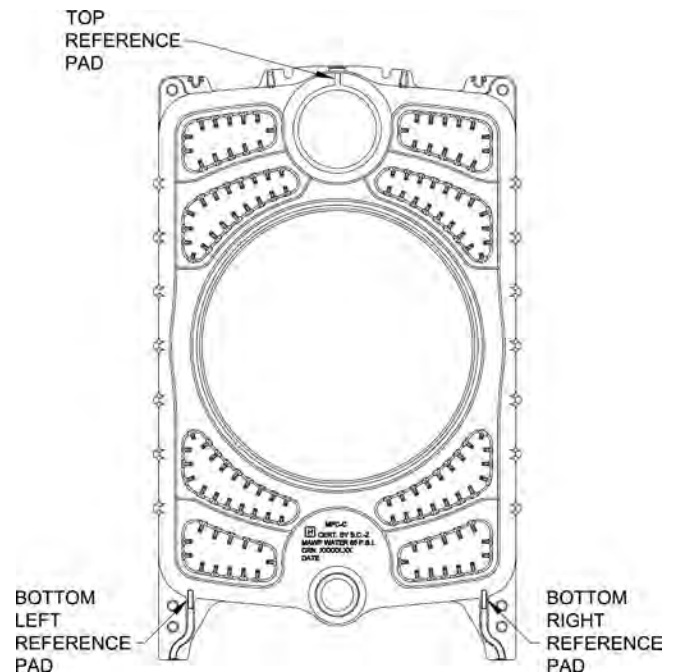


Figure 8: Inspection Pad Locations for Section Draw-up

WARNING

This is a forced draft fired boiler and sealant must be applied where specified for proper and safe performance. Burnham Commercial has approved section joint sealants (silastics) manufactured by Dow-Corning under the product number RTV 736, and Sil-Bond under the product number RTV 6500.

WARNING

Sections must be drawn-up tight immediately after properly applying sealant for best results. Although sections may be joined within two (2) hours of applying sealant, humidity and temperature affect cure time. If a “thick skin” has been formed on the sealant bead, remove and re-apply sealant.

Step k. Position the next adjoining section to be assembled, **so that the side with the sealing tongue around the combustion chamber and perimeter is facing the mating side of the rear section.** Sections must always be assembled so that the rope groove on one section mates to the sealing tongue on the next section in the assembly.

Step l. Clean and lubricate the nipple ports on the mating (tongue) side of the adjoining section. Place the nipple ports of the adjoining section onto the nipples previously installed in the rear section. To facilitate assembly, it is advisable to enter the upper nipple first in its port. Then enter the lower nipple in its respective port. If necessary, place a lifting bar (crowbar) under the center of the section and lift the nipple port onto the upper nipple. Drive section in place with a heavy block of wood, striking blows as squarely as possible over nipple ports.

Step m. From Manual Draw-up Kit, locate and assemble two (2) sets that include a 3/4" x 23" lg. threaded rod, 6 1/2" dia. pressure plate, 3/4" flat washer and 3/4" hex nut as shown in Figure 5. Insert one assembly through each of the 3" and 4" NPT bosses on rear section until pressure plate is tight against the boss. Locate and place the 8 3/4" dia. pressure plate on the opposite end of threaded rod in upper nipple port. Place remaining 6 1/2" dia. pressure plate on rod protruding through lower nipple port. Install a 3/4" washer, 3/4" coupling spacer, 3/4" washer and 3/4" hex nut on each rod. Center upper pressure plates on nipple port and boss while tightening nut until tension holds assembly in place. Repeat for lower assembly. Refer to Figure 5 to verify proper arrangement.

Step n. DRAW UP SECTION SLOWLY AND EVENLY. When you start, machined surfaces between adjoining sections should be approximately 3/8" to 1/2" apart. The 7" nipple will pull harder than the 3" nipple. If two (2) people are pulling simultaneously, stop periodically to verify that gaps between adjoining sections are equal at both nipple ports. If not, pull the nipple with the larger gap until equal before proceeding. Continue draw-up, paying close attention to the nipple lubricant as it squeezes when the sections come in close contact. The lubricant should continue to squeeze out until the sections are connected metal to metal at the designated inspection pads shown in Figure 8. **If the sections still do not appear to be drawn metal to metal, use the feeler gauge provided to measure any gaps at the locations identified in Figure 8.** (Unless specified otherwise, gaps should be only measured at these locations). A maximum gap of .025".

KEEP NIPPLES ALIGNED WITH NIPPLE PORTS. If necessary, tap edge of nipples lightly with a blunt tool or rod to keep nipples from cocking while sections are being drawn-up. **DO NOT DRAW UP SECTION WHEN NIPPLES ARE COCKED.** If the torque required becomes excessive, periodically place a heavy block of wood over each nipple port and strike as squarely as possible with several blows to relieve tension on the draw-up rods.

Step o. Remove Draw-up Rod Assemblies and set aside.

Step p. Prepare center section on block assembly to receive next casting, see Figure 5. Clean the rope grooves around the combustion chamber and perimeter of the section with a wire brush. Repeat Step 'd' through step 'p' with the following exceptions:

- During Step 'd' procedure, apply multi-purpose spray adhesive to combustion chamber rope groove as well as perimeter groove.
- During Step 'e' procedure, locate 86" length of red silicone coated fiberglass rope. Starting at 9 o'clock position, push rope into groove and continue around combustion chamber until rope overlaps starting point. Mark joint, cut-off excess and seal joint per instructions.
- During Step 'j' procedure, apply sealant to the (6) flueway sealing grooves on the center section.

BE SURE TO APPLY THE SILICONE COATED FIBERGLASS ROPE AND SEALANT to the grooved joints between

adjacent sections as the boiler operates with a positive pressure in the firebox and products of combustion will escape between sections unless they are properly sealed. The rope and sealant should be applied before each section is placed on the assembly.

NOTICE

As assembled length increases, use 3/4" coupling nuts and additional rods, provided in Kit, to extend draw-up rod length.

Step q. CONTINUE ASSEMBLING SECTIONS IN THEIR RESPECTIVE ORDER until the block assembly is complete. Be certain that all sections are drawn up iron-to-iron at both nipple ports.

DO NOT REMOVE the draw-up tool, leave it under tension until the retention rods are in place.

Step r. Locate the threaded 5/8" retention rods, washers, tension springs and nuts supplied in Boiler Assembly Carton marked 'BAC'. Assemble both top retention rod assemblies as shown in Figure 5, Detail B, using the proper arrangement per Table VI. The tension spring should always be located at the rear of the boiler. These rod assemblies can be lowered directly into slotted lugs on each side of the upper nipple port. Hand tighten the rear nuts only, do not torque nut at this time.

All casting legs have two (2) holes. Slide the lower retention rods through the upper hole in each leg. Start at the front or rear, which ever is easiest, per the arrangement shown in Table VI. With the rods in place, install a 5/8" flat washer and 5/8" hex nut on each rod protruding through the front legs. On 8 through 18 section block assemblies, additional rods and couplings nuts are required to span the distance. On these larger sizes, thread couplings on front rods to mid point of coupling (halfway), pull next rod forward to meet front coupling. Hold front coupling, not front rod, while threading rear rod into coupling nut until it contacts front rod at mid point.

Repeat this process until both lower rods protrude through rear section legs. In the following order, place a 5/8" flat washer, 5/8" tension spring and 5/8" hex nut on both rods. Hand tighten rear nut only to remove all slack from the lower rod assemblies. Use a torque wrench adjusted for 20 ft/lb of torque to tighten four (4) rear hex nuts. In lieu of a torque wrench, use a combination wrench to tighten nuts approximately 3/4 turn beyond hand tight, to set tension.

Excess length of draw-up rods must not extend beyond front and rear section to ensure proper fit of jacket, adjust accordingly.

Step s. Release tension on Manual Draw-up Assemblies and remove.

Now proceed to Step C of this Section on Page 24, Hydrostatic Test.

Table VI: Proper Arrangement of Threaded Rods and Coupling Nuts

Model	Block Assembly Size			Retention Rod / Coupling Nut Arrangement			
	Front Section	Center Section	Rear Section	Front	← Block Assembly →	Rear	
MPC4	1	2	1	24¼" Rod			
MPC5	1	3	1	31" Rod			
MPC6	1	4	1	37¾" Rod			
MPC7	1	5	1	44½" Rod			
MPC8	1	6	1	24¼" Rod / Nut / 27" Rod			
MPC9	1	7	1	24¼" Rod / Nut / 34" Rod			
MPC10	1	8	1	31" Rod / Nut / 34" Rod			
MPC11	1	9	1	37¾" Rod / Nut / 34" Rod			
MPC12	1	10	1	44½" Rod / Nut / 34" Rod			
MPC13	1	11	1	24¼" Rod / Nut / 27" Rod / Nut / 34" Rod			
MPC14	1	12	1	31" Rod / Nut / 27" Rod / Nut / 34" Rod			
MPC15	1	13	1	37¾" Rod / Nut / 27" Rod / Nut / 34" Rod			
MPC16	1	14	1	44½" Rod / Nut / 27" Rod / Nut / 34" Rod			
MPC17	1	15	1	44½" Rod / Nut / 34" Rod / Nut / 34" Rod			
MPC18	1	16	1	31" Rod / Nut / 27" Rod / Nut / 27" Rod / Nut / 34" Rod			

2. ASSEMBLY OF SECTIONS (HYDRAULIC DRAW-UP)

- MPC4 through MPC12 Section Assemblies

The entire assemblage may be drawn-up at one time using the hydraulic draw-up equipment providing the operation is completed within two (2) hours after the sealant was applied to the first casting in the assembly. If time limit is reached, draw-up partial section assembly before continuing.

- MPC13 through MPC18 Section Assemblies

The total assemblage should be first drawn-up into two (2) sub-assemblies. Each sub-assembly may be drawn-up at one time using the hydraulic draw-up equipment providing the operation is completed within two (2) hours after the sealant was applied to the first casting in the sub-assembly. No more than 12 sections should be drawn up at one time.

“Hydraulic Draw-Up Tool Kit” is available through Burnham by ordering part number 101904-01.

Step a. Repeat Step ‘a’ through Step ‘1’ under “Field Assembled Sections (Manual Draw-Up)”.

Step b. Continue driving sections in place (in their respective order) until all sections are in the assemblage. Ground surfaces between adjoining sections should be spaced 3/8” to 1/2” apart. Spacing of more than 1/2” will limit number of sections that can be drawn up in one unit and could indicate cocked nipples.

WARNING

Sealant must be properly applied to ALL boiler joints. Failure to properly seal the boiler joints will result in combustion gas leaks through the joint. DO NOT operate boiler with combustion gas leaks. The sealant should be applied before each section is placed on the assembly.

On long boiler assemblies, it may be necessary to draw up a partial block if the entire boiler is not ready to be drawn up tight within two (2) hours of the first application of the Silastic. If the block assembly time extends overnight, the partial block completed must be drawn up tight before leaving the boiler overnight. If a joint springs apart, it must be re-drawn tight within two (2) hours of first application of Silastic to the joint.

Step c. From the Hydraulic Draw-up Kit, locate and assemble one (1) set of draw-up assemblies that each include 3/4” x 23” lg. threaded rod(s), 3/4” coupling nut(s) (if applicable), the appropriate pressure plate, washer and 3/4” hex nut as shown in Figure 5. Insert one (1) assembly through each of the 3” and 4” NPT bosses on rear section until pressure plate is tight against the boss. Locate and place the 8 3/4” dia. pressure plate on

the opposite end of threaded rod in upper nipple port. Place remaining 6 1/2” dia. pressure plate on rod protruding through lower nipple port.

NOTICE

As assembled length increases, use 3/4” coupling nuts and additional rods, provided in Kit, to extend draw-up rod length.

Slide 3/4” washer, hydraulic ram and second 3/4” washer over each rod assembly. Remove all slack from assemblies and apply draw-up rod clamps.

Center upper pressure plates on nipple port and boss while pumping ram set until tension holds assembly in place. Repeat for lower assembly. Refer to Figure 5 to verify proper arrangement.

CAUTION

Rods should be approximately centered in openings so that rods and couplings (when used) do not drag on pipe thread in end section tappings.

WARNING

READ THE STATEMENTS BELOW BEFORE ATTEMPTING TO USE HYDRAULIC EQUIPMENT.

- Release pressure in ram pumps before attempting to remove clamps.
- Do not stand in line with draw-up rods at either end when hydraulic pressure is being applied. As a safety measure, ends of draw-up rods should be covered while sections are being drawn in case rods should snap while under tension.
- Do not operate ram against draw-up coupling.
- Do not operate pump after ram has reached stroke limit.

Step d. Draw-up Sections

Use hydraulic rams to draw up sections by applying pressure alternately on the draw-up rods. When rams reach stroke limit, release pressure in ram pumps and then move clamps to new position.

Step e. Continue to draw-up until all sections make contact at the ground joints.

If the sections still do not appear to be drawn metal to metal, use feeler gauge provided to measure any gaps at the locations identified in Figure 8. (Unless specified otherwise, gaps should be measured at these locations). A maximum gap of .025” is acceptable.

Step f. After all sections have been drawn up, retention rods must be installed. Do not release hydraulic pressure until the retention rods are in place.

Step g. Locate the threaded 5/8" retention rods, washers, tension springs and nuts supplied in 'BAC' Boiler Assembly Carton. Assemble both top retention rod assemblies as shown in Figure 5, Detail B, using the proper arrangement per Table VI. The tension spring should always be located at the rear of the boiler. These rod assemblies can be lowered directly into slotted lugs on each side of the upper nipple port. Hand tighten the rear nuts only, do not torque nut at this time.

All casting legs have two (2) holes. Slide the lower retention rods through the upper hole in each leg. Start the front or rear, whichever is easiest, per the arrangement shown in Table VI. With the rods in place, install a 5/8" flat washer and 5/8" hex nut on each rod protruding through the front legs. On 8 through 18 section block assemblies, additional rods and couplings nuts are required to span the distance. On these larger sizes, thread couplings on front rods to mid point of coupling (halfway), pull next rod forward to meet front coupling. Hold front coupling, not front rod, while threading rear rod into coupling nut until it contacts front rod at mid point.

Repeat this process until both lower rods protrude through rear section legs. In the following order, place a 5/8" flat washer, 5/8" tension spring and 5/8" hex nut on both rods. Hand tighten rear nut only to remove all slack from the lower rod assemblies. Use a torque wrench adjusted for 20 ft/lb of torque to tighten four (4) rear hex nuts. In lieu of a torque wrench, use a combination wrench to tighten nuts approximately 3/4 turn beyond hand tight, to set tension.

Excess length of draw-up rods must not extend beyond front and rear section to ensure proper fit of jacket, adjust accordingly.

Step h. Release tension on hydraulic pumps and rams and remove.

- C. HYDROSTATIC TEST** - After the boiler sections have been assembled, it is essential that the boiler be hydrostatically tested before the jacket frame, insulation, internal wiring, piping or jacket is installed. **THIS TEST IS AN ASME CODE REQUIREMENT.**
1. Block Assembly must be free of air, provide valve in 4" bushing on top supply tapping to purge air during the filling process. Plug all boiler tappings and fill entirely with cold water.

CAUTION

DO NOT install gauge until after hydrostatic testing the boiler. Gauge failure may result.

2. Assembled boilers shall be subjected to a hydrostatic test of not less than 1½ times the maximum allowable working pressure, as established by the relief valve supplied with the boiler. For example, a boiler with a 50 psi relief valve must be subjected to a test pressure of 75 psig to 85 psig.

WARNING

Failure to properly hydrotest all boilers at the correct pressure may result in section assembly failure in operation.

3. **EXAMINE BOILER CAREFULLY, INSIDE AND OUTSIDE**, to insure against leaks from cocked nipples or through concealed breakage caused in shipping and handling. This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims.
4. After making certain that there are no leaks, drain boiler and remove plugs from boiler trim and other connections.

SECTION III - BOILER ASSEMBLY INSTRUCTIONS (Knockdown Boiler)

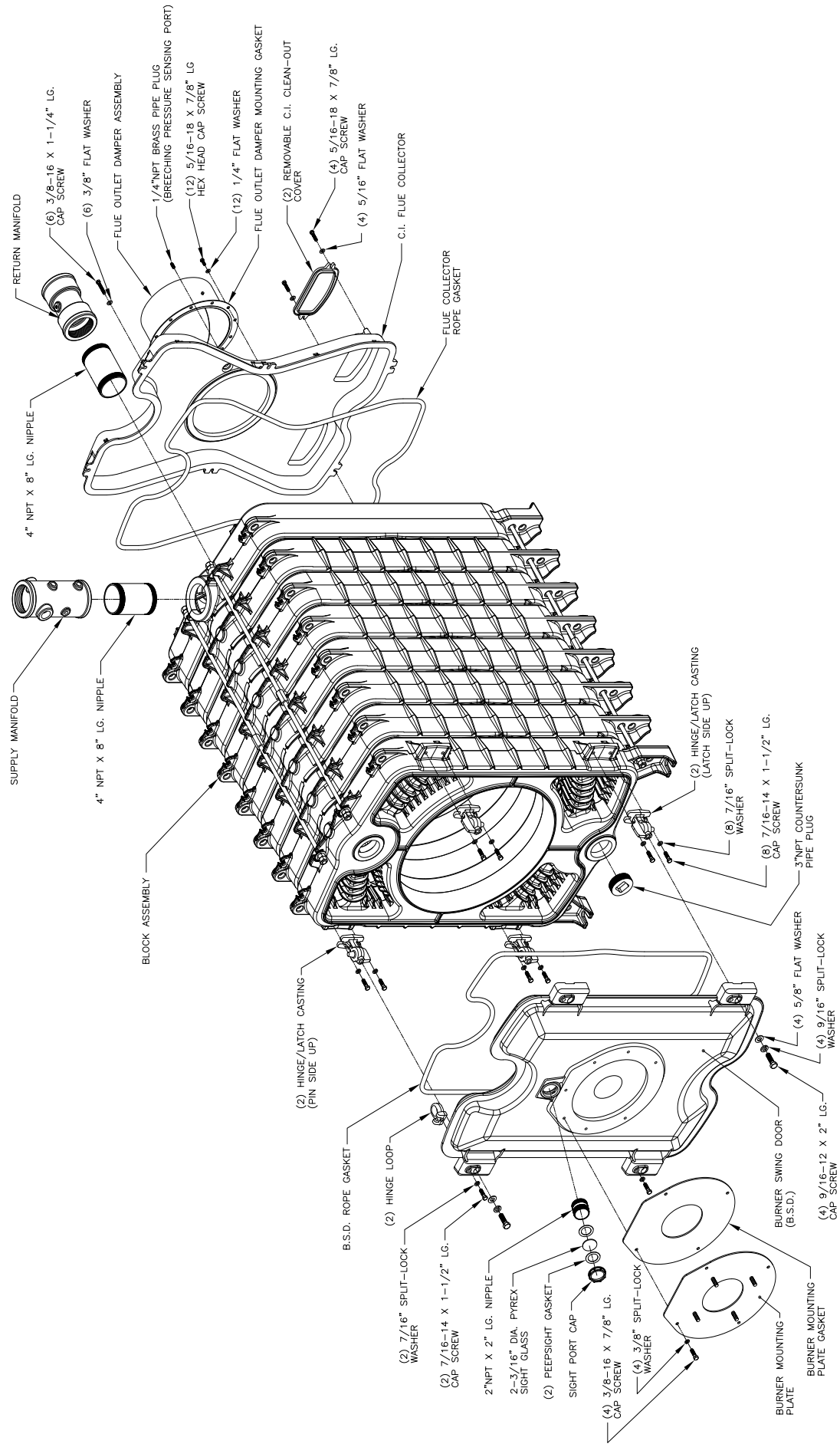


Figure 9: Installation of Common Parts to Block Assembly

SECTION III - BOILER ASSEMBLY INSTRUCTIONS (KD Boiler) - Continued

NOTE: Only factory packaged and firetested units are eligible to bear the UL listing mark.

A. INSTALL COMMON PARTS TO BLOCK ASSEMBLY, Refer to Figure 9.

1. Remove contents from Common Parts Carton marked 'CPC'.
2. Locate four (4) C. I. burner swing door (BSD) hinge/latch castings, two (2) C. I. BSD hinge loop castings, ten (10) 7/16 split lock washers and ten (10) 7/16 -14 x 1-1/2 lg. cap screws.

NOTICE

Front section and burner swing door (BSD) are designed to use universal parts that can be mounted to make the hinge set work for either left hand or right hand swing.

For the purpose of these instructions, Burnham will default to mounting hinge set for left hand swing (left side).

3. Determine best hinge arrangement for your installation based on room size, piping arrangement, burner, fuel lines, utilities and service clearances.
4. For BSD left hand swing (left side hinge) -
 - a. Install hinge/latch castings, pin side up, on hinge pads located on left side of front section. Use two (2) 7/16" split lock washers and two (2) 7/16 -14 x 1-1/2 lg. cap screws per hinge pin, see Figures 9 and 10. Secure hardware wrench tight.
 - b. Install hinge/latch castings, latch side up, on hinge pads located on right side of front section using same hardware for hinge latch as was used for hinge pin, see Figures 9 and 10. Secure wrench tight.

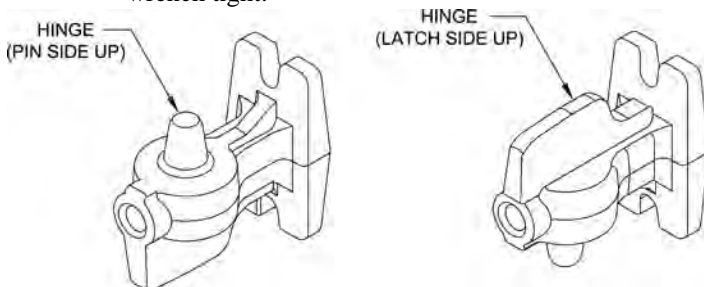


Figure 10: Universal Hinge/Latch Casting

- c. Locate and position burner swing door (BSD) vertically against wall or structure to allow access to both side, front and rear (insulation side).
- d. Install hinge loops inside hinge pockets located on left side of BSD by engaging keyway slot in loop over pocket key to lock position, see Figure 11. Attach each hinge loop with one (1) 7/16" split lock washer and one (1) 7/16 -14 x 1-1/2" lg. cap screw, secure hardware wrench tight.

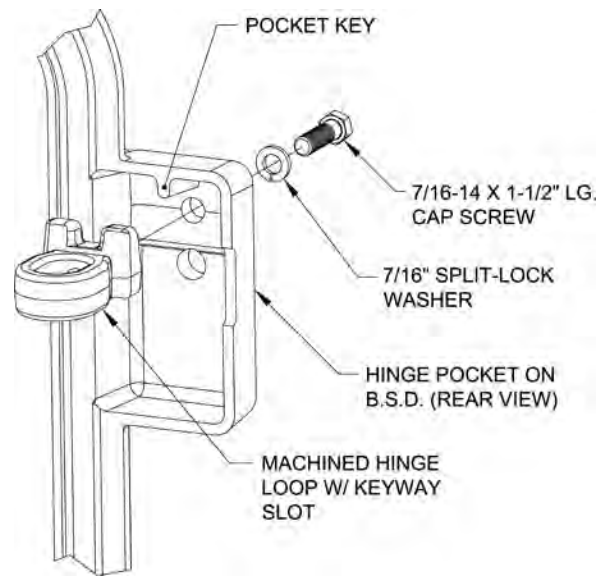


Figure 11: Hinge Loop

5. For BSD right hand swing (right side hinge) -
 - a. Repeat 4a thru 4d but install hinge set and hardware in reverse locations for right hand swing.
6. Complete Burner Swing Assembly (BSD) - see Figure 9.
 - a. Install BSD rope gasket to rear of door.
 - b. If necessary, clean the rope groove around perimeter of the BSD with a wire brush.
 - c. Using the multi-purpose spray adhesive provided, apply the adhesive to the perimeter rope groove. Follow the directions on the can for application and tack time.
 - d. Locate a 158" length of silicone coated fiberglass rope from common parts carton. Starting at 3 o'clock position, push rope into groove and continue around perimeter until rope overlaps the starting point. Rope should be approximately 4" longer than required. Use a permanent black marker to mark the rope approximately 1/8" beyond point of overlap. Cut off excess with scissors or utility knife and wooden cutting block.
 - e. Apply a generous bead of red sealant to both ends of cut rope, push ends together and smooth excess sealant over joint with your finger.

WARNING

Sealant must be properly applied to ALL boiler joints. Failure to properly seal the boiler joints will result in combustion gas leaks through the joint. DO NOT operate boiler with combustion gas leaks.

- f. Install observation port sight glass. Locate 2" x 2-1/2" lg. nipple, sight glass envelope and 2" conduit bushing. Thread 2" nipple into observation port tapping directly above burner adapter opening on front of BSD. Open sight glass envelope and in this order place gasket, sight glass and gasket into conduit cap. Thread cap onto 2" nipple, hand tighten only until cap and glass are snug. Do not over tighten.
 - g. Do not install BSD on hinges at this time. Door must be installed after jacket assembly.
7. Mount C. I. flue collector to rear section - see Figure 9.
- a. Use a wire brush to clean the rope groove on back surface of rear section.
 - b. Using the multi-purpose spray adhesive provided, apply the adhesive to the perimeter rope groove. Follow the directions on the can for application and tack time.
 - c. Locate remaining 158" length of silicone coated fiberglass rope from common parts carton. Starting at 3 o'clock position, push rope into groove and continue around perimeter until rope overlaps the starting point. Rope should be approximately 4" longer than required. Use a permanent black marker to mark the rope approximately 1/8" beyond point of overlap. Cut off excess with scissors or utility knife and wooden cutting block.
 - d. Apply a generous bead of red sealant to both ends of cut rope, push ends together and smooth excess sealant over joint with your finger.
 - e. Locate six (6) 3/8" flat washers and six (6) 3/8 -16 x 1-1/4" lg. cap screws from hardware bag. Thread one (1) washer and cap screw in each of the bottom tapings approximately four (4) turns. Lift flue collector and engage bottom slots over cap screws to position unit on rear section. Install remaining hardware in four (4) upper slots and hand tighten hardware. Using a wrench, tighten hardware evenly, use an alternating pattern from top to bottom.
8. Do not install Flue Collector Clean-out Covers at this time. Covers must be installed after Jacket Rear Panels are in place.
9. Install 1/4" NPT brass plug into tapping located at 10 o'clock position on flue outlet collar. Wrench tighten plug, but do not over tighten. See Figure 9.
10. Apply thread sealant and install 3" NPT pipe plug in lower tapping on front section. Wrench tighten until water tight. See Figure 9.
11. Install Supply Manifold and 4" NPT nipple - See Figure 9.
- a. Locate supply and return manifold carton marked 'S/RM CI' and remove contents.
 - b. Apply thread sealing compound to both ends of the 4" NPT nipple and install one end of the 4" NPT nipple into the non-flow arrowed end of the CI Supply Manifold and hand tighten the assembly.
 - c. Then - Install the threaded end of the 4" NPT nipple into 4" NPT tapping located on top of rear section.
 - d. Wrench - CI Supply Manifold Assembly until water tight and 1 1/2" NPT tapings (relief valve) are aligned with front and rear axis as shown in Figure 12.

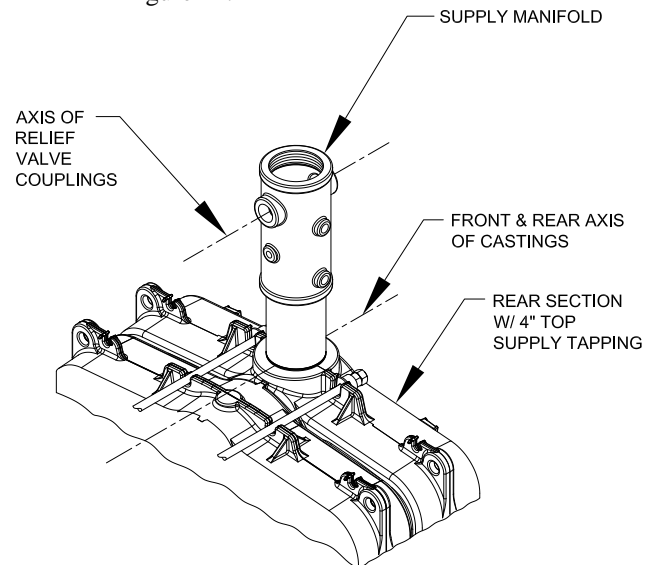


Figure 12: Orientation of Supply Manifold

NOTICE

Orientation of supply manifold is critical for proper alignment of controls and relief valve piping.

- B. Assemble and Install Return Water Mixing Tube (RWMT RC) and Return Manifold into Block Assembly.**
1. Locate return water mixing tube carton marked 'RWMT RC' and remove contents.
 2. Modular return water mixing tubes start as a two (2) tube assembly with end cap and increase with block size to become a seven (7) tube assembly with end cap. Assemble each RWMT RC in exact order shown in Table VII based on boiler size. Also refer to Figure 13.
 3. Per Table VII, starting at the front, install RWMT End Cap on tube shown in next column to the right. Open 'RH' hardware bag and locate 3 oz. tube of sealant. Apply a continuous bead of silver silicone sealant to end of tube opposite the flared collar or ring. The end cap and each tube has a series of holes for alignment when secured together. Align the holes, push end cap over tube end with sealant and secure with four (4) #8 x 1/2 hex head screws.

Table VII: Modular Return Water Mixing Tube (RWMT RC)

RWMT RC ORDER OF ASSEMBLY									
FRONT – BLOCK ASSEMBLY – REAR									
BOILER SIZE	CARTON P/N	P/N	(QTY) DESCRIPTION	P/N	(QTY) DESCRIPTION	P/N	(QTY) DESCRIPTION	P/N	(QTY) DESCRIPTION
4-SECTION	102804-04	100728-01	(1) RWMT CAP			102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-01	(1) 22 $\frac{1}{8}$ " RWMT
5-SECTION	102804-05	100728-01	(1) RWMT CAP			102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-02	(1) 28 $\frac{3}{4}$ " RWMT
6-SECTION	102804-06	100728-01	(1) RWMT CAP			102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-03	(1) 18 $\frac{3}{4}$ " RWMT
7-SECTION	102804-07	100728-01	(1) RWMT CAP	100727-01	(1) 21 $\frac{5}{8}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-01	(1) 22 $\frac{1}{8}$ " RWMT
8-SECTION	102804-08	100728-01	(1) RWMT CAP	100727-01	(1) 21 $\frac{5}{8}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-02	(1) 28 $\frac{3}{4}$ " RWMT
9-SECTION	102804-09	100728-01	(1) RWMT CAP	100727-01	(1) 21 $\frac{5}{8}$ " RWMT W/ FLARED COLLAR	102789-01	(1) 17 $\frac{13}{16}$ " RWMT W/ FLARED COLLAR	102788-03	(1) 18 $\frac{3}{4}$ " RWMT
10-SECTION	102804-10	100728-01	(1) RWMT CAP	100727-02	(1) 28 $\frac{1}{16}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-03	(1) 18 $\frac{3}{4}$ " RWMT
11-SECTION	102804-11	100728-01	(1) RWMT CAP	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-03	(1) 18 $\frac{3}{4}$ " RWMT
12-SECTION	102804-12	100728-01	(1) RWMT CAP	102789-01	(1) 17 $\frac{13}{16}$ " RWMT W/ FLARED COLLAR	102789-01	(1) 18" RWMT W/ FLARED COLLAR	102788-01	(1) 22 $\frac{1}{8}$ " RWMT
13-SECTION	102804-13	100728-01	(1) RWMT CAP	100727-02	(2) 28 $\frac{1}{16}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-02	(1) 28 $\frac{3}{4}$ " RWMT
14-SECTION	102804-14	100728-01	(1) RWMT CAP	100727-02	(2) 28 $\frac{1}{16}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-03	(1) 18 $\frac{3}{4}$ " RWMT
15-SECTION	102804-15	100728-01	(1) RWMT CAP	102790-01	(2) 18" RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-02	(1) 28 $\frac{3}{4}$ " RWMT
16-SECTION	102804-16	100728-01	(1) RWMT CAP	102789-01	(2) 17 $\frac{13}{16}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-03	(1) 18 $\frac{3}{4}$ " RWMT
17-SECTION	102804-17	100728-01	(1) RWMT CAP	100727-01	(1) 21 $\frac{5}{8}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-01	(1) 22 $\frac{1}{8}$ " RWMT
18-SECTION	102804-18	100728-01	(1) RWMT CAP	100727-01	(1) 21 $\frac{5}{8}$ " RWMT W/ FLARED COLLAR	102790-01	(1) 18" RWMT W/ FLARED COLLAR	102788-02	(1) 28 $\frac{3}{4}$ " RWMT

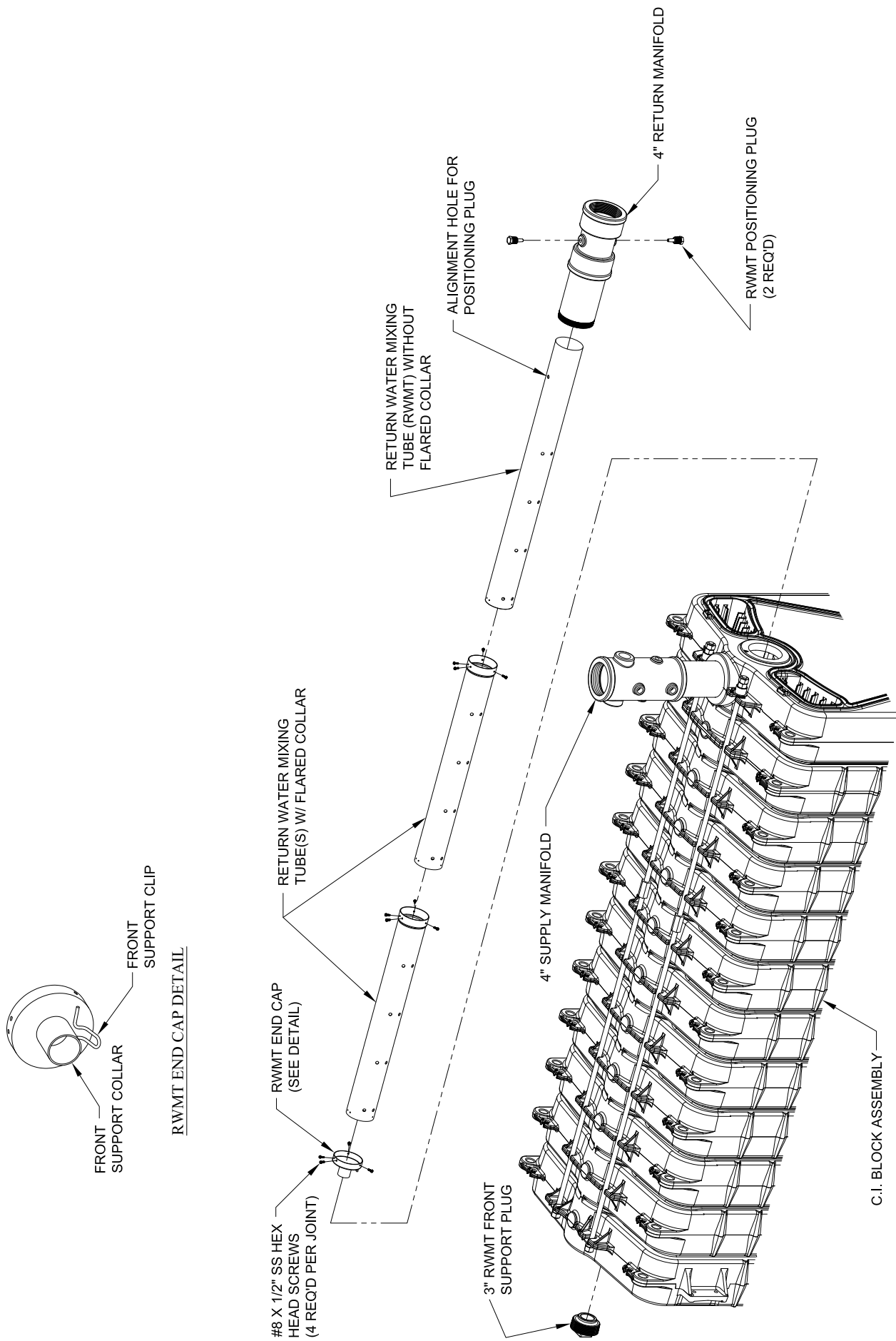


Figure 13: Return Water Mixing Tube RC Assembly and Installation

Repeat this process for each joint, securing the previous assembly to the tube shown in next column to the right in Table VII, also refer to Figure 13 for details. If space behind the boiler is limited, on RWMT's having two or more tubes, it may be necessary to assemble the end cap to the adjoining tube and then insert the assembly, capped end first, into the 4" NPT tapping on the back of the rear section before joining the remaining tube(s). Allow approximately 1½" of the tube to protrude from the tapping, so that the next tube can be secured to the assembly. Once the next tube is secured, insert the assembly further into the tapping. Repeat this procedure as necessary for up to seven (7) tube RWMT assemblies.

4. Insert the completed RWMT assembly into the 4" NPT tapping until the end cap reaches the front of the boiler. The front support clip on the end cap must rest on the internal shelf inside of the upper 3" NPT boss on the front section. If necessary, insert a long screw driver, wooden dowel or a short length of 1/2 pipe through the 3" NPT tapping and into the support collar on the end cap to lift and maneuver the tube into position.
5. Install CI Return Manifold and 4" NPT Nipple - See Figure 9.
 - a. Apply thread-sealing compound to both ends of 4" NPT nipple and hand tighten nipple into one end of the CI Return Manifold (return manifold casting is symmetrical about the ends).
 - b. Slide the CI Return Manifold Assembly over RWMT, and install the threaded end of the 4" NPT nipple into 4" NPT tapping in rear section.
 - c. Wrench CI Return Manifold Assembly until watertight and ½" NPT tappings (positioning plugs) are aligned with vertical axis of rear section as shown in Figure 14.

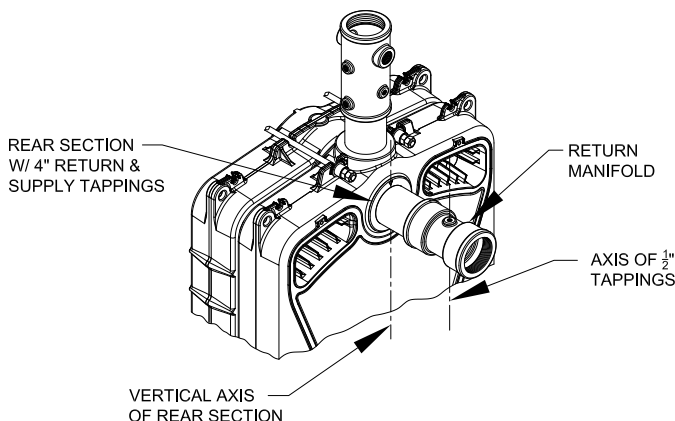


Figure 14: Orientation of Return Manifold

NOTICE

Orientation of return manifold is critical for proper alignment of return water mixing tube.

6. Thread upper and lower positioning plugs into 1/2" NPT tappings. If necessary, push forward or pull back on RWMT assembly and/or rotate until pins on positioning plugs engage alignment holes in tube, see Figure 13. Wrench both plugs until water tight.
7. Install RWMT front support plug into 3" NPT tapping on upper front section boss.
 - a. Looking through 3" tapped hole, check position of support collar on RWMT end cap. Collar should be located approximately in the center of the tapped hole both vertically and horizontally.
 - b. If necessary, adjust support collar position before installing front support plug. For horizontal adjustment, bend support clip up or down per the amount of visual mis-alignment.
 - c. Thread front support plug into 3" NPT upper front section boss, wrench plug water tight.

C. Install Jacket Support Frame to Block Assembly.

1. Locate Jacket Frame Carton(s), marked 'JF' and remove contents, see equipment list on Page 3 for quantity required.
2. Open "JF-P" Jacket Frame Parts Carton(s), packed inside Jacket Frame Carton(s), and remove contents.
3. Locate support channel brackets which are shipped flat and need to be hand formed by bending both legs down 90°, see Figure 15.

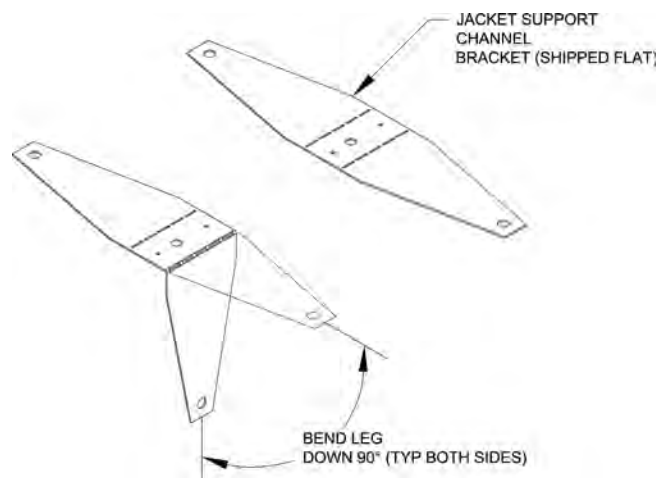


Figure 15: Hand Form Support Channel Bracket

4. Locate horizontal support channels and FH-1 Hardware Bag(s). Position two (2) support channel brackets on floor and place horizontal support channel over brackets. All three (3) holes in both parts **must** be in alignment, if they are not, rotate bracket. Secure brackets to channel using four (4) #8 x 1/2 hex head sheet metal screws, see Figure 16. Repeat until all horizontal channels and brackets are assembled.

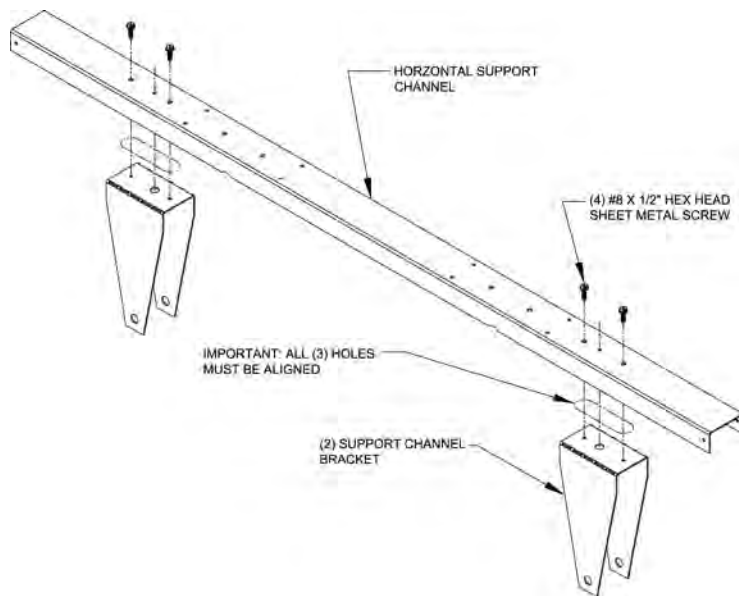


Figure 16: Secure Brackets to Horizontal Channel

5. Add front/center section mounting hardware to all but one (1) horizontal support channel assembly. Lay channel assembly on floor with brackets facing up, see Figure 17a. Install hardware as shown with two (2) washers and two (2) 1/2" lg. spacers between bracket legs and one (1) washer and one (1) hex nut on each end of 3/8" -16 x 3-1/4" lg. rod, see assembled end view in Figure 17a. Repeat for all brackets.
6. Add rear section mounting hardware to remaining horizontal support channel assembly. Lay channel assembly on floor with brackets facing up, see Figure 17b. Install hardware as shown with one (1) 1-3/4" lg. spacer between bracket legs, one (1) washer and one (1) hex nut on one end of 3/8" -16 x 13-3/8" lg. threaded rod, with one (1) washer,

one (1) 2-5/8" lg. spacer, two (2) washers and one (1) hex nut on the opposite end of rod. Repeat for second bracket, refer to assembled end view in Figure 17b.

7. Mount **front/center** horizontal channel assembly(ies) to appropriate casting(s) on block assembly as outlined in Table VIII. Position threaded rods on channel assemblies over slotted lugs on casting as shown in Figure 18a. Spread inside washers until rod drops to bottom of slot as shown in Figure 18a, Detail 'A'. Hand tighten nuts, make sure washers engage casting below washer retaining lugs, see Detail B. Repeat for all remaining bracket attachment points.
8. Mount **rear** horizontal channel assembly to rear section and adjacent center section as shown in Figure 18b. Position assembly behind supply manifold, spread washers and lower threaded rod into slotted openings on both castings as shown in Figure 18b, Detail A. Hand tighten nuts, make sure washers engage casting below washer retaining lugs as shown in Detail B. Repeat for opposite side.
9. Wrench tighten hex nuts on all channel assemblies making sure rods are fully seated in slotted openings.
10. Locate and install lower **front/center** section brackets to casting legs. Brackets are universal and can be used on either side of block assembly. Refer to Table VIII for appropriate casting leg to be used for bracket attachment. Brackets mount to rear surface of leg with offset toward the rear as shown in Figure 19. Hold bracket at a 45° angle while engaging upper slot over threaded tie rod, rotate bracket around rod until lower slot is aligned with lower hole in casting leg. Insert 5/8 -11 x 2" lg. bolt with washer through cast hole in leg and slot in bracket.

Table VIII: Frame/Bracket Mounting Locations

Boiler Size	Block Assembly				
	Frame 1	Frame 2	Frame 3	Frame 4	Frame 5
4 Section	Front Section	Rear Section	-----	-----	-----
5 Section	Front Section	Rear Section	-----	-----	-----
6 Section	Front Section	Rear Section	-----	-----	-----
7 Section	Front Section	Section 4	Rear Section	-----	-----
8 Section	Front Section	Section 5	Rear Section	-----	-----
9 Section	Front Section	Section 5	Rear Section	-----	-----
10 Section	Front Section	Section 6	Rear Section	-----	-----
11 Section	Front Section	Section 6	Rear Section	-----	-----
12 Section	Front Section	Section 5	Section 9	Rear Section	-----
13 Section	Front Section	Section 5	Section 9	Rear Section	-----
14 Section	Front Section	Section 5	Section 10	Rear Section	-----
15 Section	Front Section	Section 6	Section 11	Rear Section	-----
16 Section	Front Section	Section 6	Section 11	Rear Section	-----
17 Section	Front Section	Section 5	Section 9	Section 13	Rear Section
18 Section	Front Section	Section 5	Section 10	Section 14	Rear Section

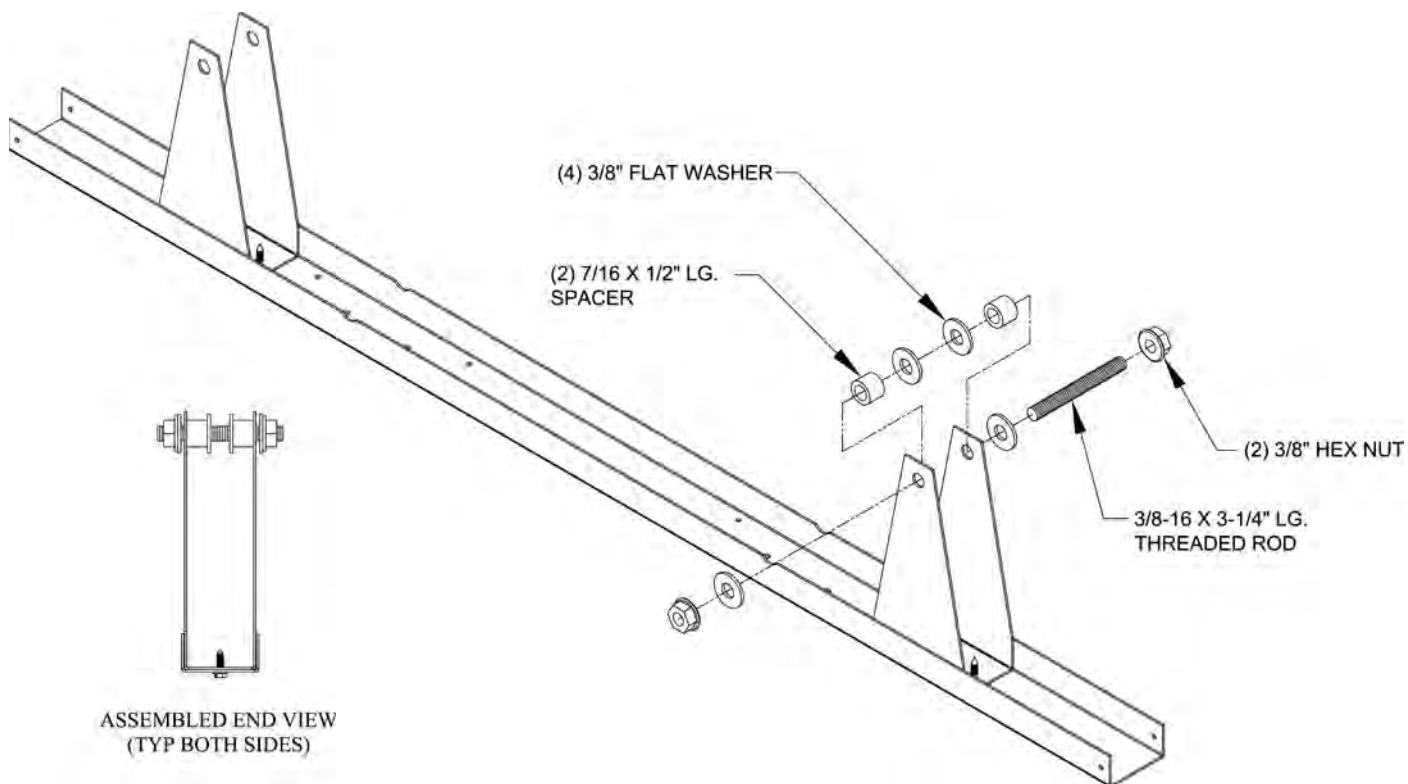


Figure 17a: Front/Center Section Horizontal Channel Assembly w/Mounting Hardware

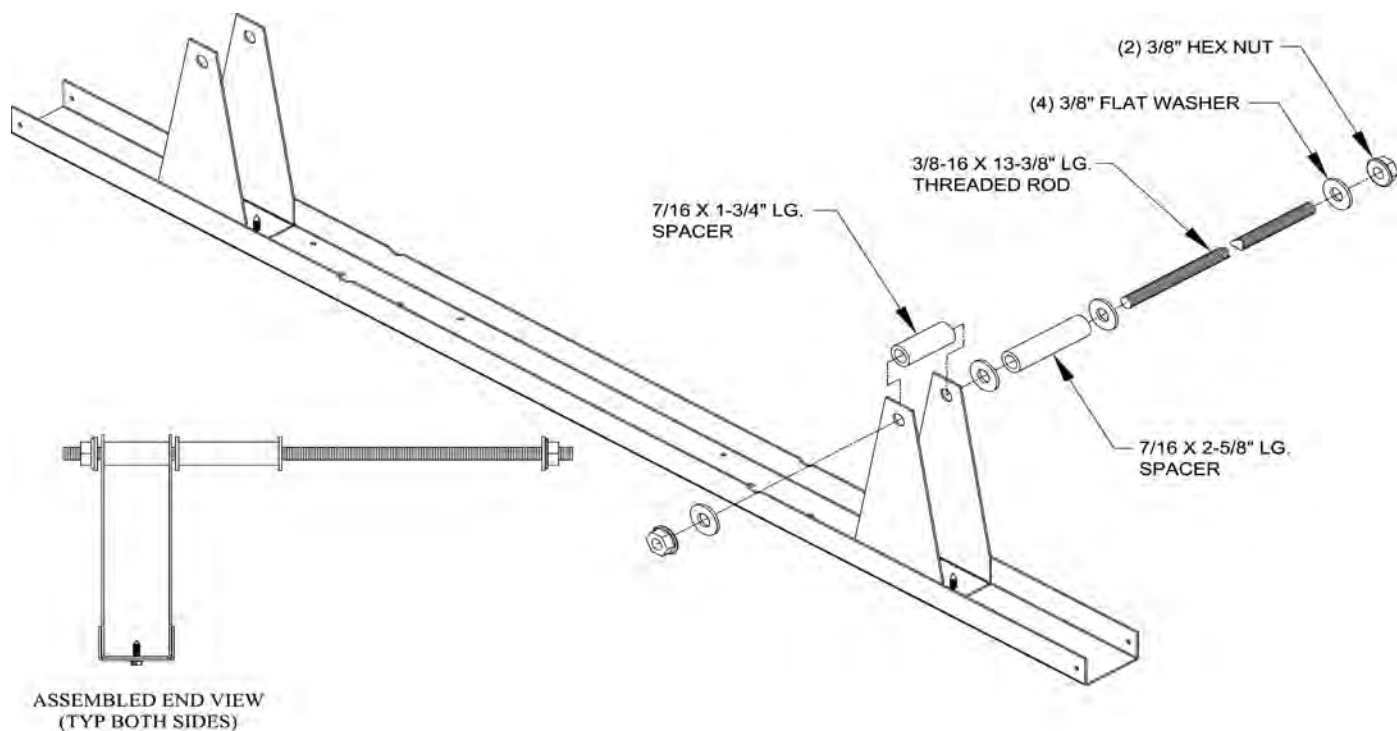


Figure 17b: Rear Section Horizontal Channel Assembly w/Mounting Hardware

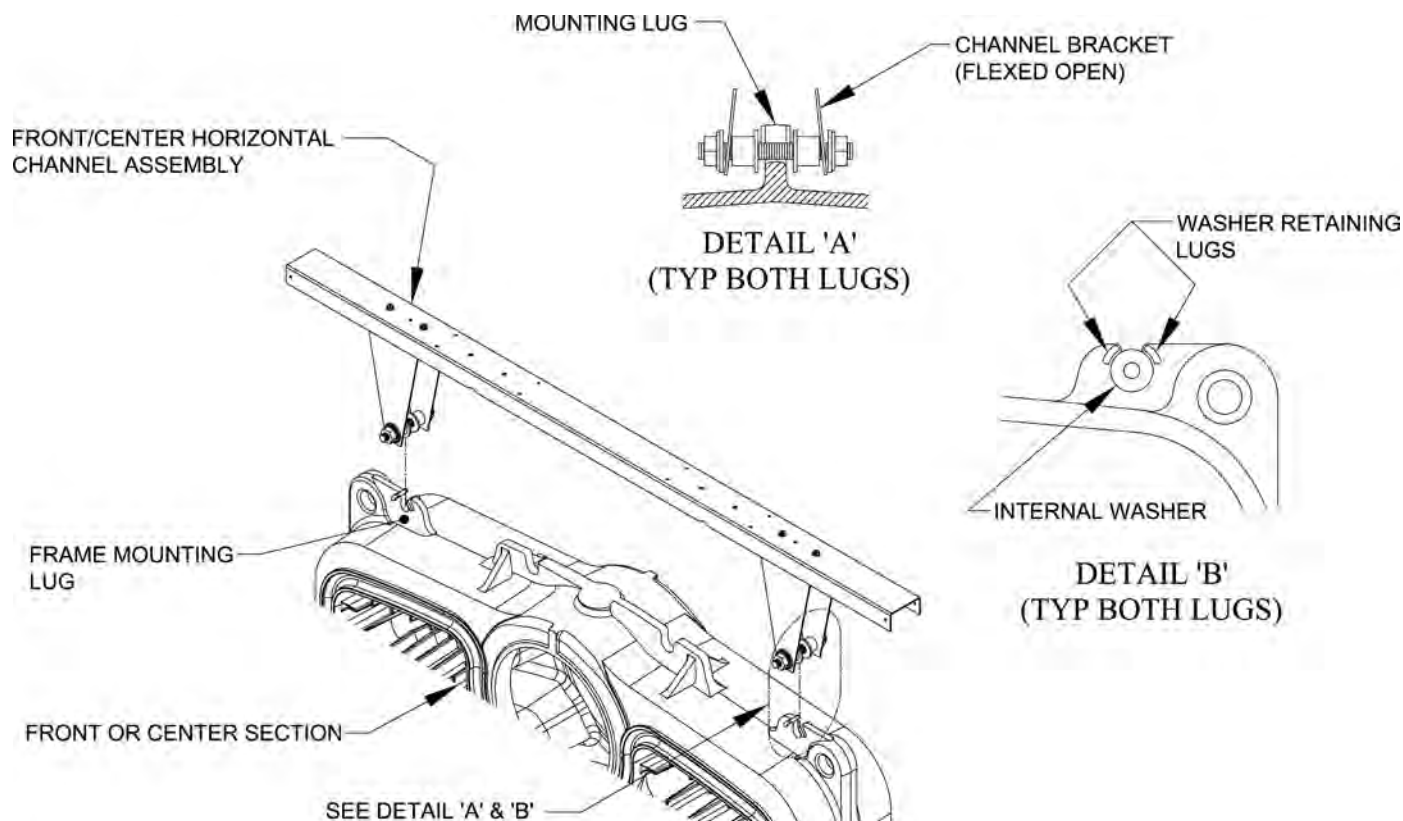


Figure 18a: Mount Front/Center Section Horizontal Channel to Block Assembly

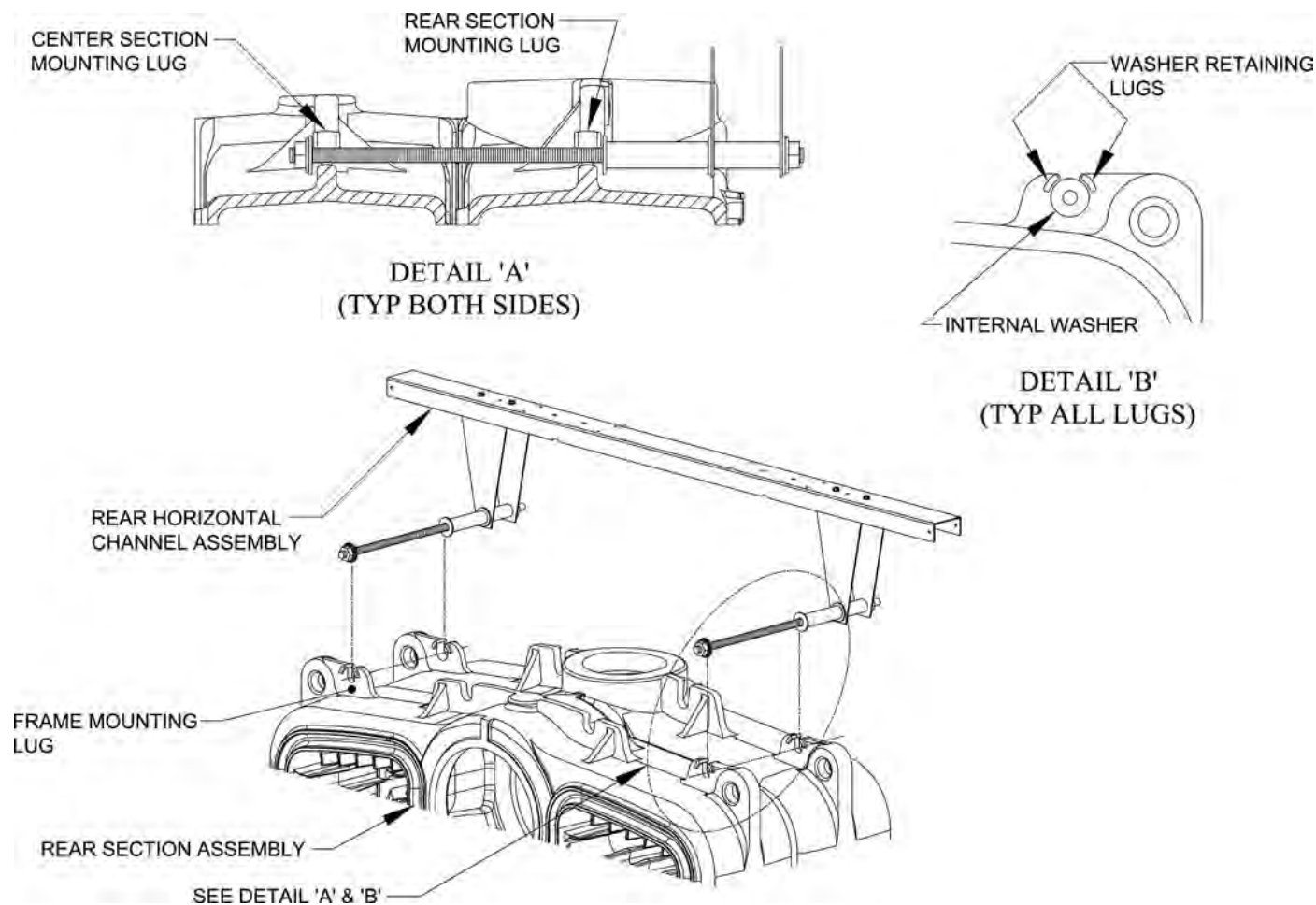


Figure 18b: Mount Rear Section Horizontal Channel to Block Assembly

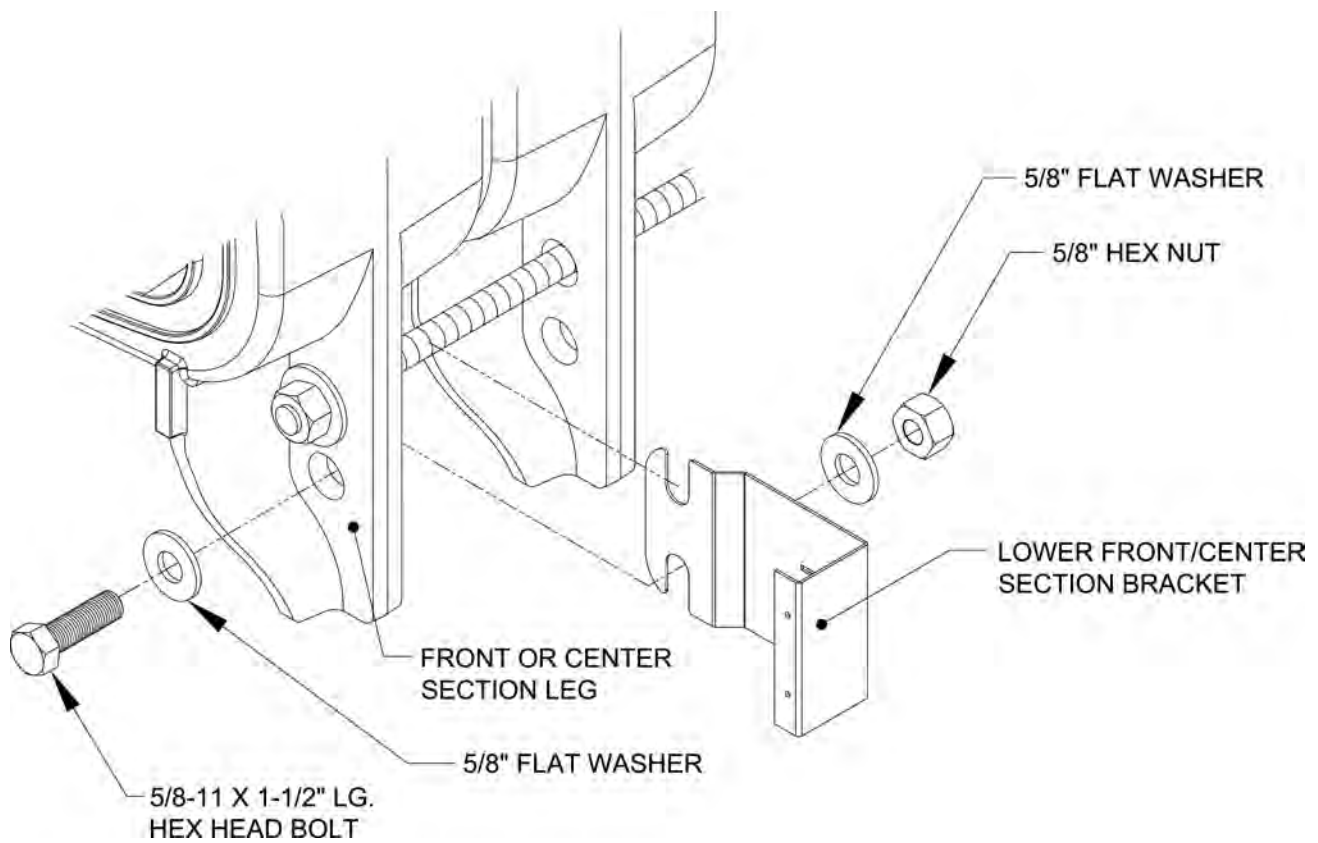


Figure 19: Attachment of Lower Front/Center Section Bracket to Casting Leg

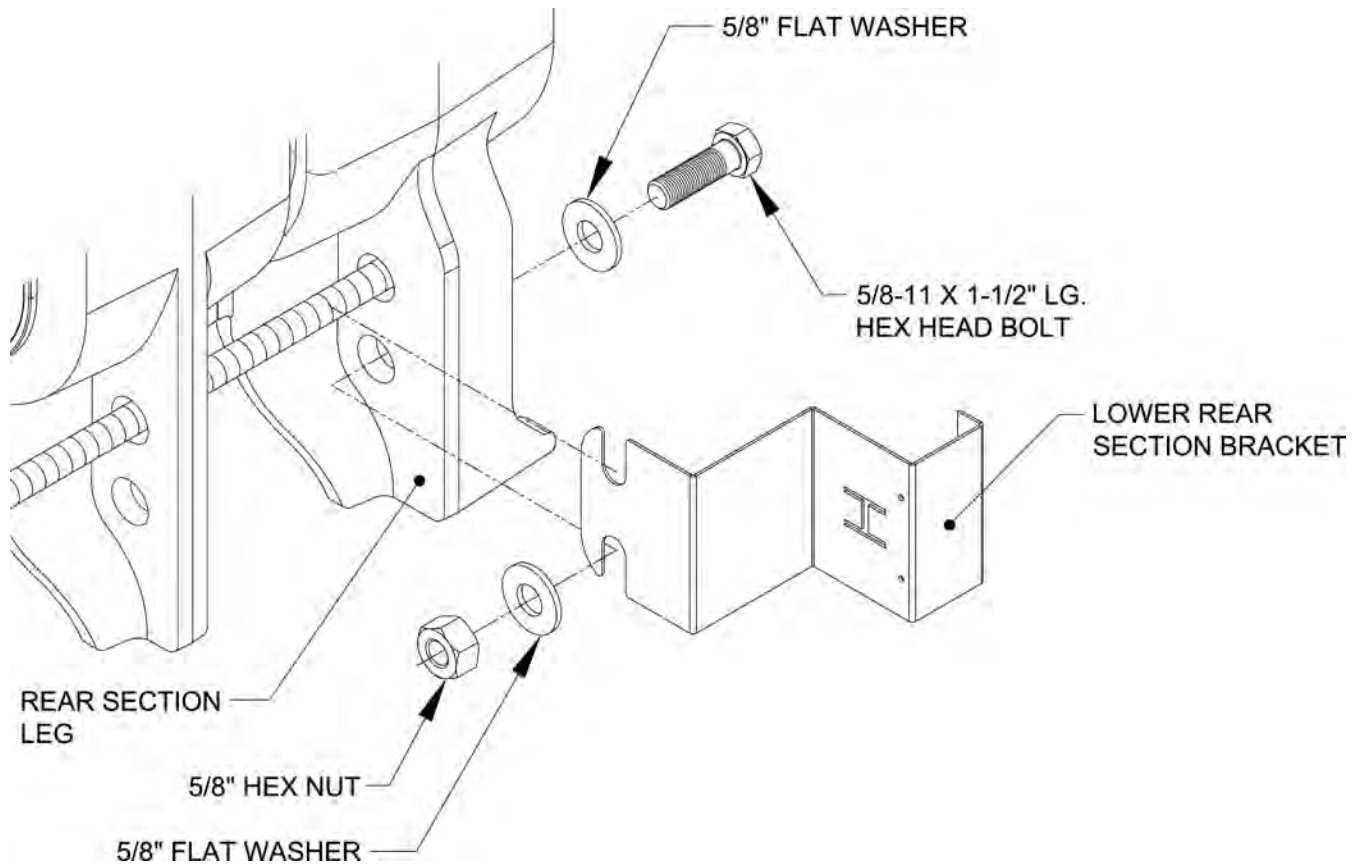


Figure 20: Attachment of Lower Rear Section Bracket to Casting Leg

Hand tighten one (1) 5/8" washer and hex nut on bolt. Do not wrench tighten at this time. Repeat for all **front/center** brackets, both sides.

11. Locate and install **rear** section brackets to casting legs. Brackets are universal and can be used on either side of block assembly. Brackets mount to front surface of leg with offset toward the rear as shown in Figure 20. Hold bracket at a 45° angle while engaging upper slot over threaded tie rod, rotate bracket around rod until lower slot is aligned with lower hole in casting leg. Insert 5/8 -11 x 2" lg. bolt with washer through cast hole in leg and slot in bracket.

Hand tighten one (1) 5/8" washer and hex nut on bolt. Do not wrench tighten at this time. Repeat for bracket on opposite side.

12. Locate and secure vertical side channels (painted black) to horizontal top channels and lower brackets. Position side channel so pilot hole, on channel face, is located at the top, see Figure 21. Engage flanges on vertical side channel over flanges on horizontal channel and secure with two (2) #8 x 1/2 sheet metal screws. Engage vertical side channel flanges over lower bracket, move bracket as necessary to align holes, secure channel with two (2) #8 x 1/2 sheet metal screws.

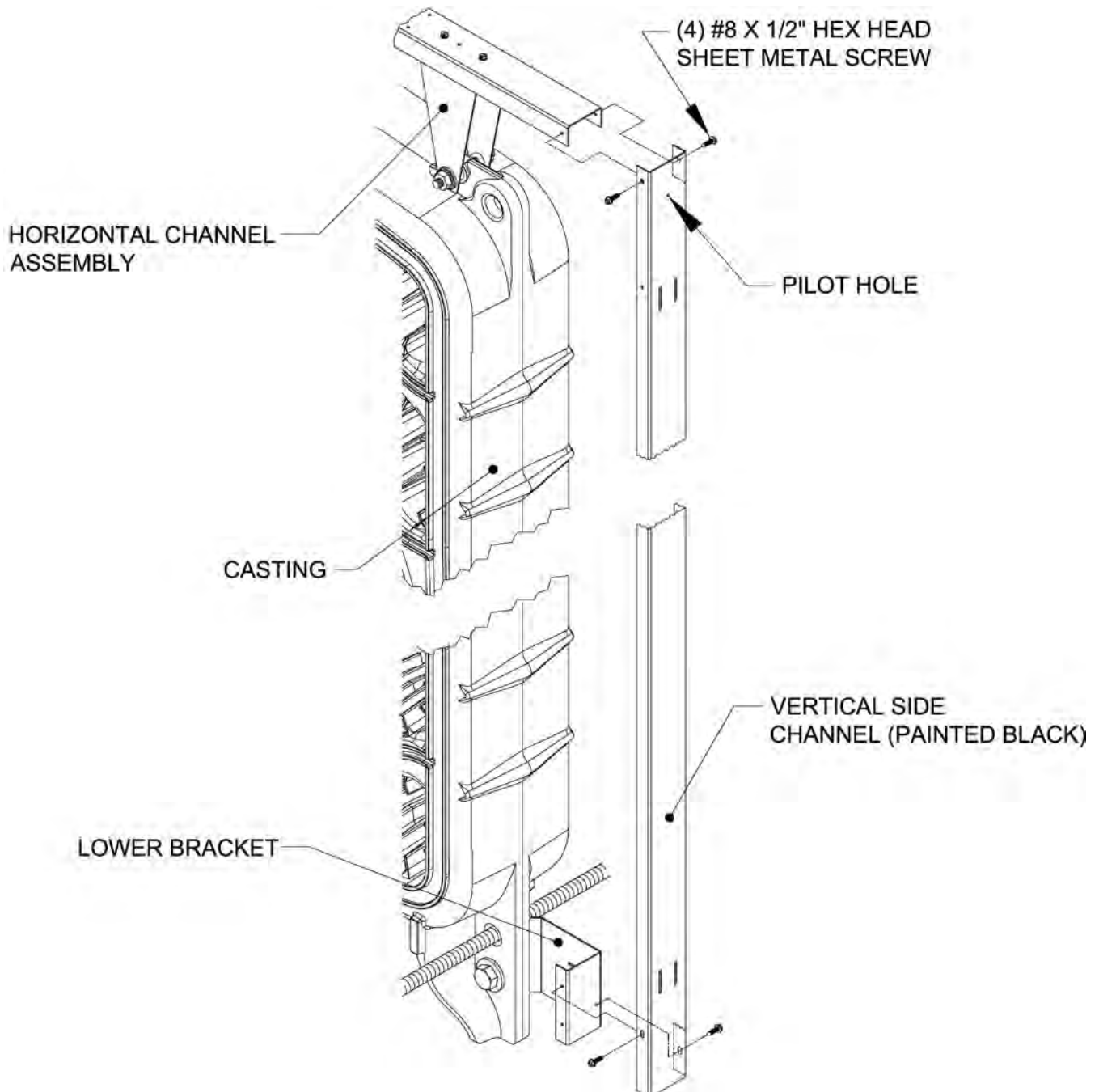


Figure 21: Securing Frame Side Channels to Horizontal Top Channel and Lower Brackets (Center Section Shown)

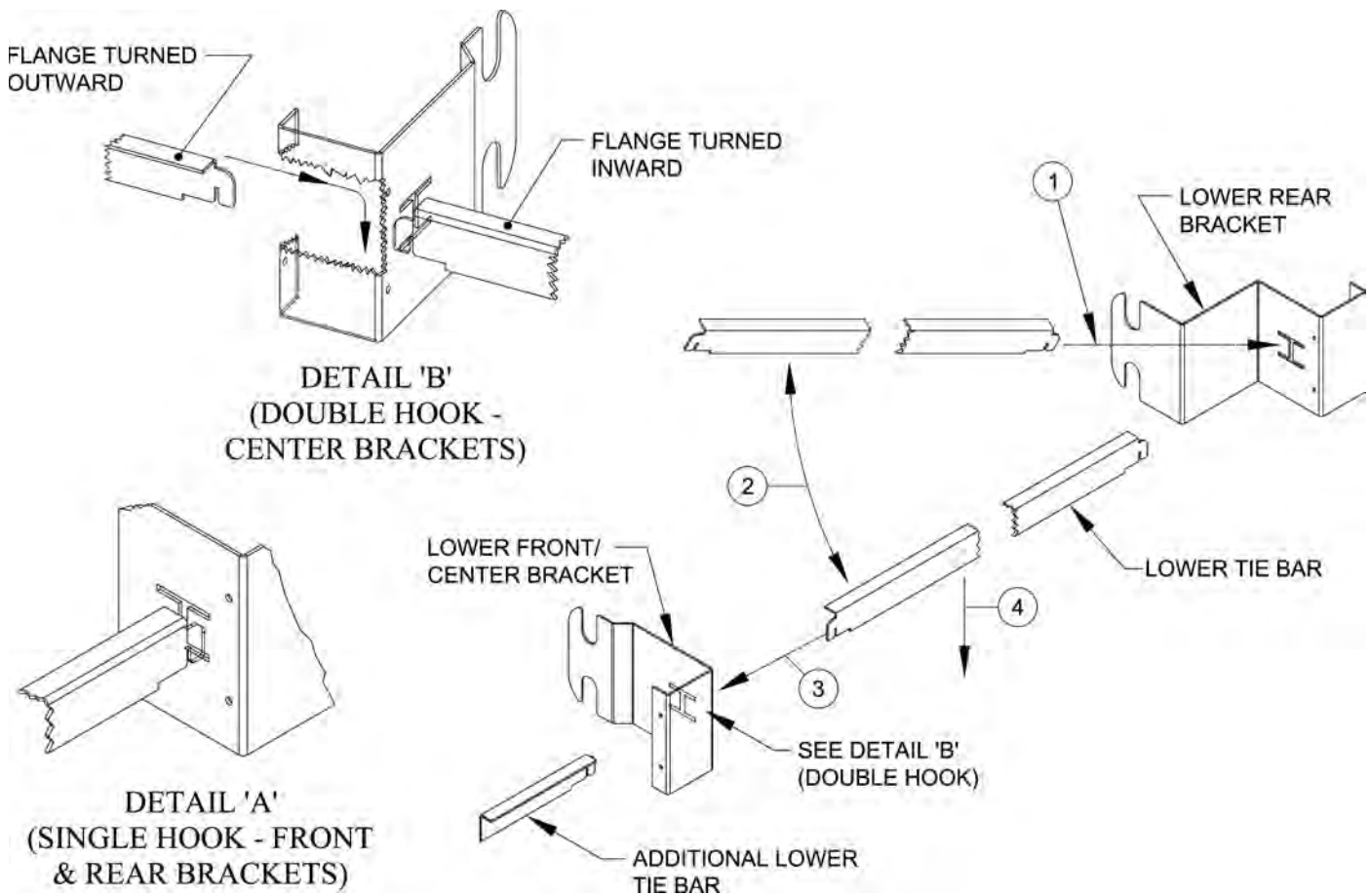


Figure 22: Lower Tie Bar Installation

Repeat operation until all vertical channels have been installed. Using an open end wrench and ratchet with socket, tighten all 5/8" bolts and nuts to secure frame brackets to casting legs.

13. Locate Jacket Carton(s), marked 'JC-2' and remove contents. Install lower tie bars into slotted 'I' openings on lower frame brackets to provide proper spacing between frame channels, refer to Figure 22. Determine proper location of tie bar by comparing it's length to the distance between brackets. Lay each tie bar on the floor at that location along both sides of boiler.

Step a. Starting at the rear and working to the front, hold the first tie bar on a slight angle and pass the end through 'I' opening in rear bracket as shown in Figure 22.

Step b. Lower the tie bar between brackets as shown in Figure 22.

Step c. Pull tie bar back and engage opposite end through 'I' opening in front or center section bracket as shown in Figure 22.

Step d. Engage slotted end of hook over lip of 'I' opening and push downward to lock position. If necessary, spread brackets by pushing or pulling vertical channels until tie bar drops into locking position, see Detail 'A' in Figure 22. For multiple tie bars, each consecutive bar must be rotated end for end so the top flanges oppose each other, for entry into 'I' opening, see Detail 'B' in Figure 22. Complete process to front bracket and repeat on opposite side.

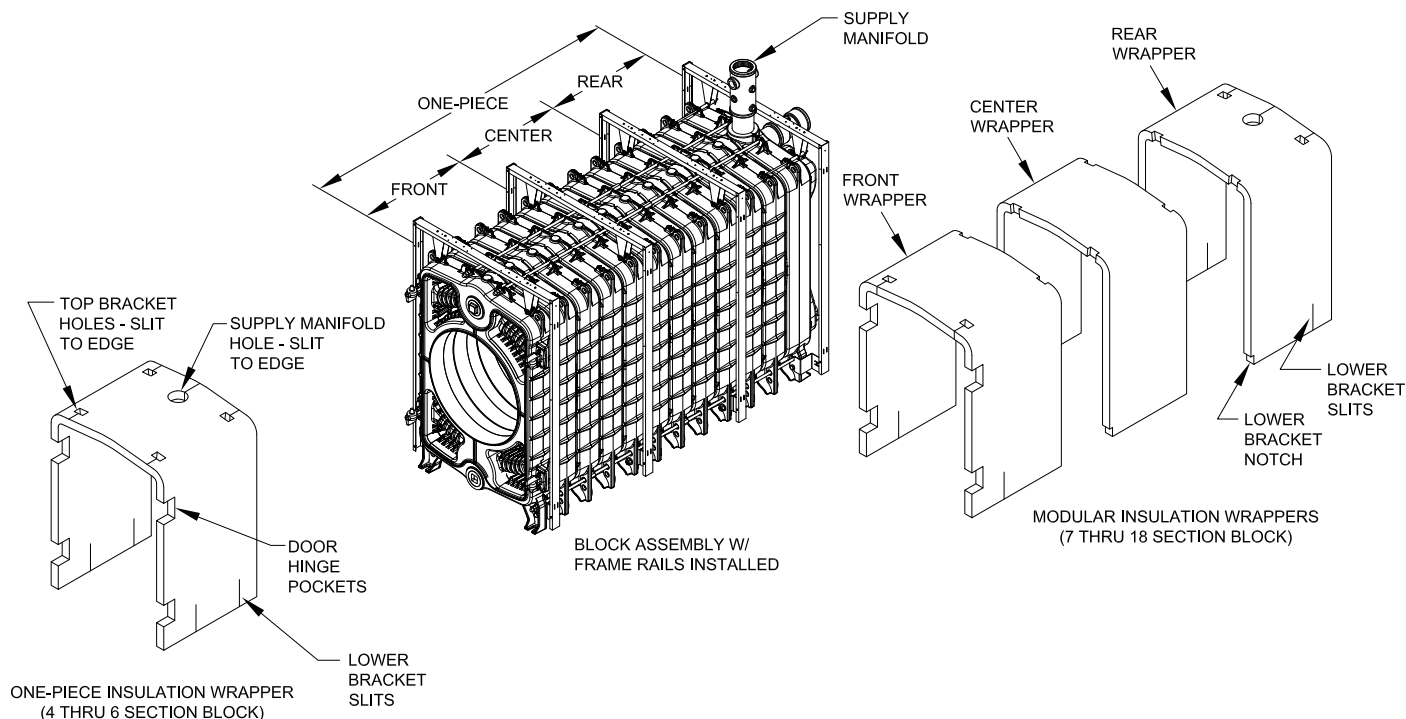


Figure 23: Heat Exchanger Insulation - One Piece and Modular Wrappers

D. Locate and Install Heat Exchanger (Block Assembly) Insulation Wrapper(s), see Figure 23.

1. **4 thru 6 Section Block Assembly** - Insulation wrapper is provided as one-piece that covers block from front to rear. Drape insulation wrapper over block assembly with supply manifold hole to the rear. Starting at top rear, pull insulation under horizontal channel, open slits and pull insulation around supply manifold and top brackets on each side. Pull both sides of insulation back between vertical channel and rear casting. Open slit at bottom and position over lower rear bracket. In the front, starting at the top, pull insulation under horizontal channel. Open slits and pull insulation around top brackets. On each side, pull insulation between vertical channel and front section, position around door hinge pockets. Open slit at bottom and position insulation around lower front bracket. Tuck bottom edges behind lower tie bars.
2. **7 thru 18 Section Block Assembly** - Insulation wrapper is provided in modular pieces that fit between and join behind each frame rail. If the insulation width matches the distance between frame rail brackets, it's the proper size for that location.

- a. **Rear Insulation Wrapper** - Starting at the rear, drape rear wrapper over block assembly with supply manifold hole facing the rear as shown in Figure 23. Pull insulation under horizontal channel, open slits and pull insulation around supply manifold and top brackets on each side. Pull both sides of insulation back between vertical channel and rear casting. Open slit at bottom and position over lower rear bracket. Tuck bottom edges behind lower tie bar.
- b. **Center Insulation Wrapper(s)** - 12 thru 18 Section Block Assembly.
Drape center wrapper over block assembly, align top notches with top frame rail brackets. Push insulation behind top and side frame rails along both edges, front and rear. Tuck bottom edges behind lower tie bars.
- c. **Front Insulation Wrapper** - Drape Wrapper over Block Assembly. Starting in the front, at the top, pull insulation under horizontal channel. Open slits and pull insulation around top brackets. On each side, pull insulation between vertical channel and front section, position around door hinge pockets. Open slit at bottom and position insulation around lower front bracket. Push rear edges of insulation behind center section frame rails. Tuck bottom edges behind lower tie bars.

E. Installing Internal Wiring Harness for Control/Safety Circuits - refer to Figures 24a through 24g.

1. See Figure 24a for layout of Internal wiring harness components.
2. Locate junction boxes shipped in Jacket Frame Carton marked 'JF'. As viewed from the **rear**,

install primary junction box (without extension piece) to horizontal channel, on the left side of supply manifold, using two (2) #8 x 1/2" lg. hex head sheet metal screws, see Figure 24b. Install secondary junction box with extension piece to horizontal channel on right side of supply manifold using two (2) #8 x 1/2" lg. sheet metal screws.

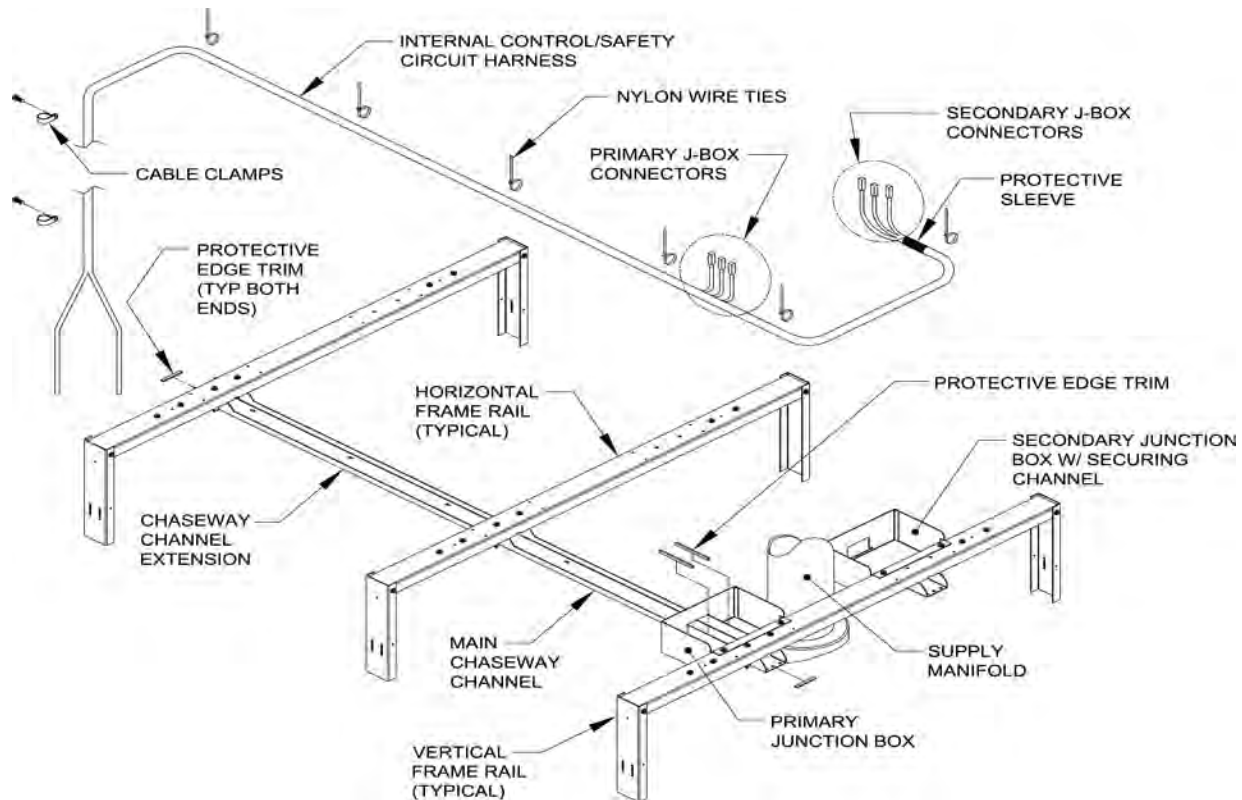


Figure 24a: Internal Wiring Harness Components

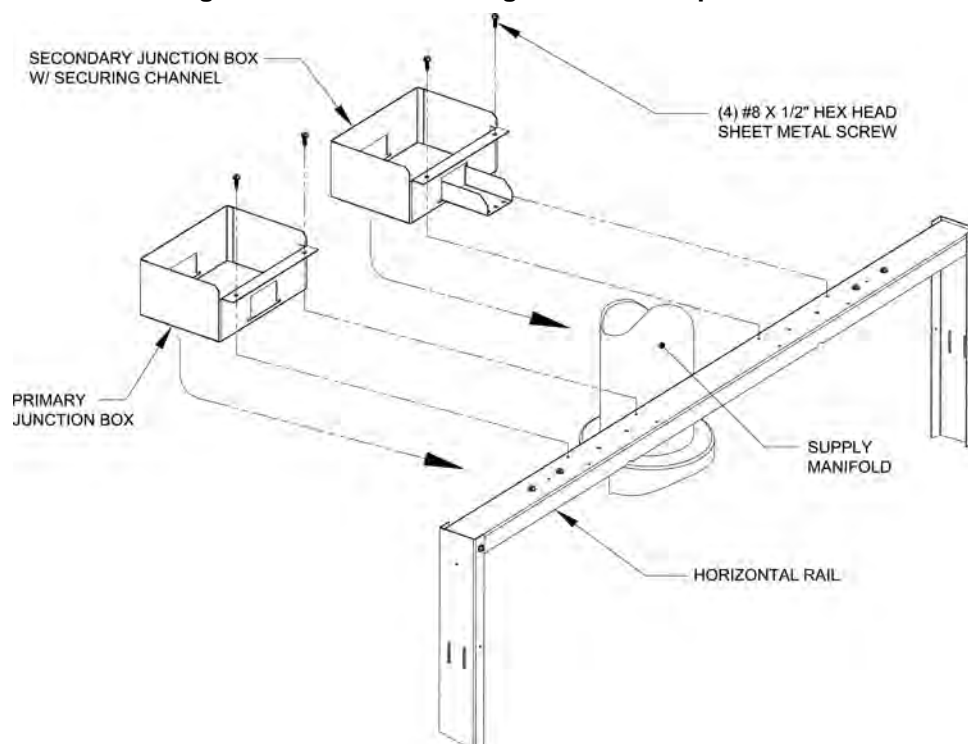


Figure 24b: Internal Wiring Harness Components - Mounting Junction Boxes

3. Locate chaseway channel(s) shipped in Jacket Carton marked 'JC-2', see Figures 24c and 24d. Identify main chaseway channel by its unequal ends. Install the end with 8 1/4" lg. side flange under horizontal rail and through openings in junction box until end protrudes past rear horizontal channel. Secure main chaseway channel to both horizontal frame rails using #8 x 2 1/2" lg. hex head sheet metal screws as shown in Figure 24c.

NOTE: Torque screws through rear frame rail until tight. At this time, **only snug** screws through forward rail(s) to allow movement in later assembly steps when attaching jacket top corner panels.

On 8 thru 18 sections block assemblies, install chaseway channel extension(s), see Figure 24d.

Position channel extension under next horizontal rail, secure bracket on extension to previously installed channel with two (2) #8 x 1/2" lg. hex head sheet metal screws. Torque these screws until tight. Secure front of channel extension to next horizontal rail with two (2) #8 x 2 1/2" lg. sheet metal screws. Based on block size, repeat until chaseway extension has been secured to horizontal rail on front section.

4. Install protective edging to raw edges of chaseway channel(s) - Locate 'JH-1' Hardware Bag, packed in JC-1 Jacket Carton. From raw stock provided in Hardware Bag, cut two (2) pieces of protective edging 1-13/16" lg. and two (2) pieces 4-11/16" long.

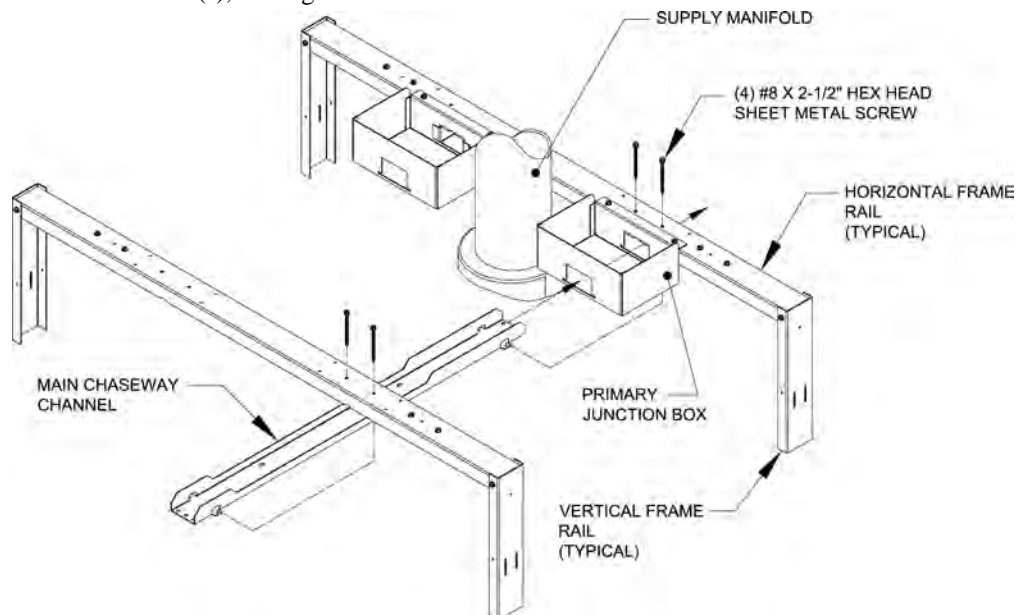


Figure 24c: Internal Wiring Harness Components - Install Main Chaseway Channel

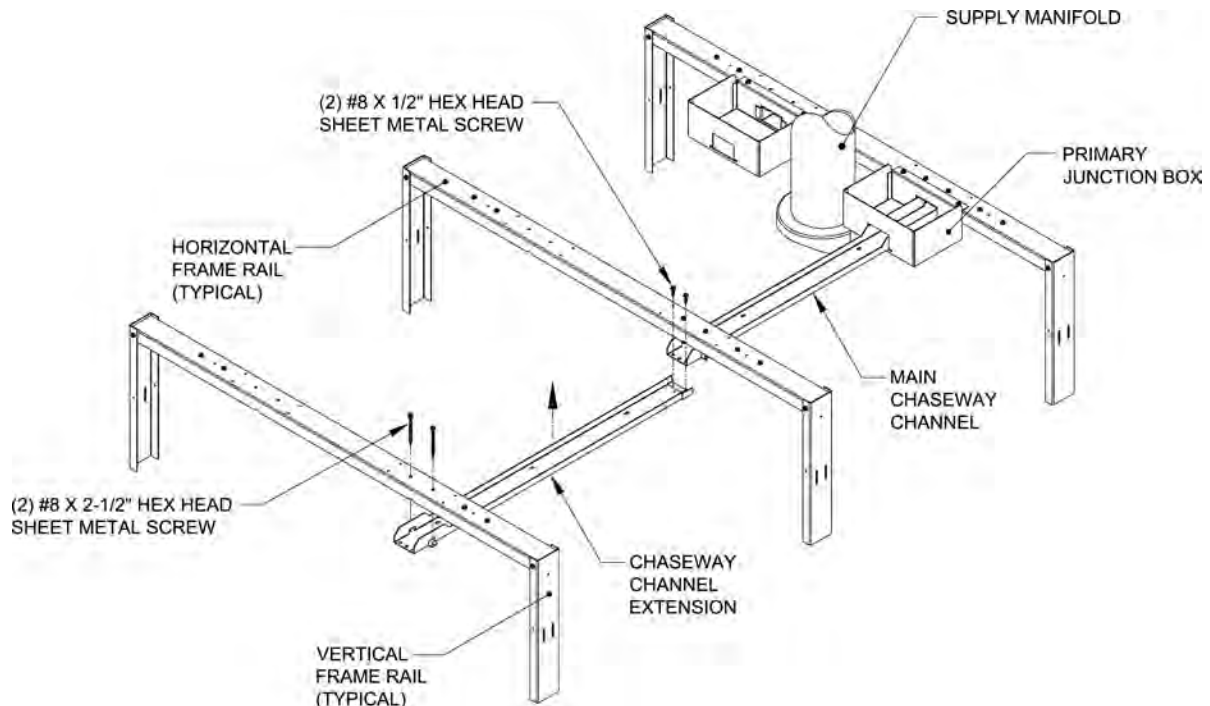


Figure 24d: Internal Wiring Harness Components - Install Chaseway Channel Extension(s)

Install 1-13/16" lg. pieces on horizontal raw edges at both ends of chaseway channel assembly. Install 4-11/16" lg. pieces to vertical chaseway channel flanges inside primary junction box as shown in Figure 24e.

5. Locate and install internal control/safety circuit wiring harness. Start with harness end that has three (3) connectors, insert connectors through rectangular opening on front and rear of primary junction box. Pull harness through J-box until second set of three (3) connectors can be inserted through front opening in J-box. Center connectors in primary J-box and secure harness to chaseway using nylon wire tie No. 1, see Figure 24f.

Note: If Sage Boiler Control (SBC) is to be used with boiler, refer to installation section of Sage Boiler Control Instruction Manual (located in Sage Boiler Control Parts Carton) at this time. Review installation section of SBC manual in its entirety and keep on hand during assembly of boiler. Installation of SBC sensors and wiring is much easier when it is done in parallel with installation of MPC internal wiring harness and jacket panels.

Pull on harness to remove slack in J-box, secure harness to end of chaseway channel using wire tie No. 2 as shown in Figure 24f.

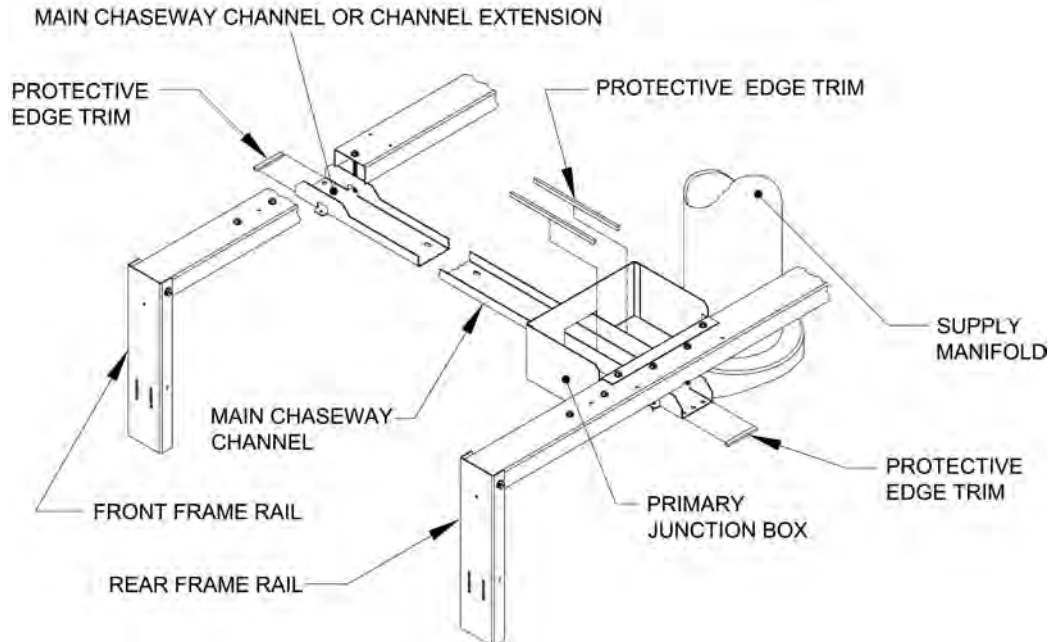


Figure 24e: Internal Wiring Harness Components - Install Protective Edging

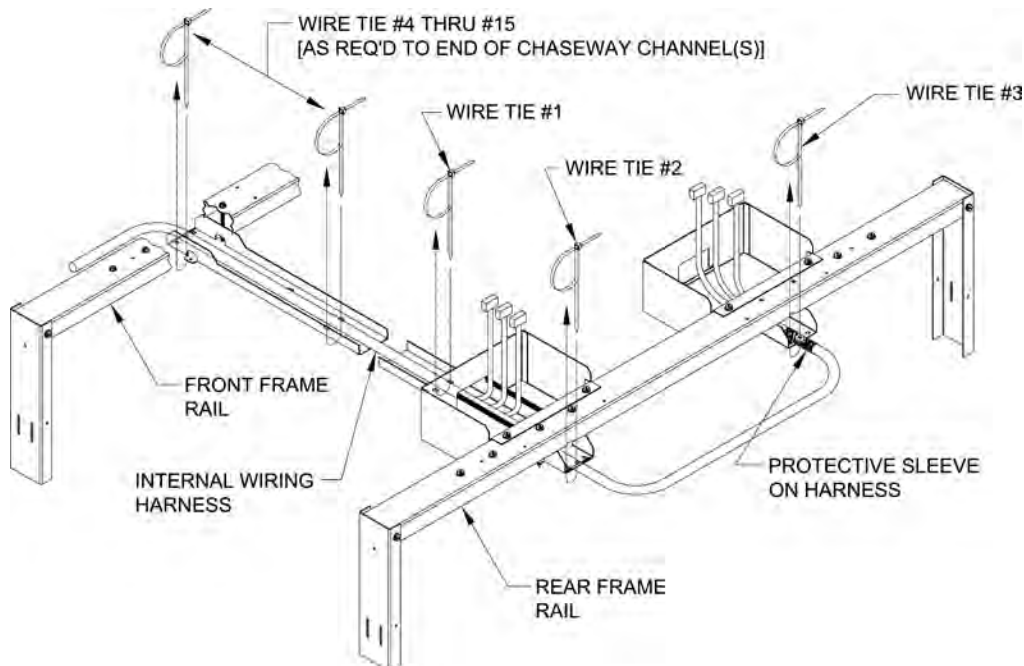


Figure 24f: Internal Wiring Harness Components - Install and Secure Harness to Chaseway

Insert first set of harness connectors through opening in rear of secondary junction box. Remove excess slack between J-boxes until protective sleeve is centered on raw edge of channel extension, secure harness to channel using nylon wire tie No. 3, see Figure 24f.

Use remaining nylon cable ties to secure harness to chaseway channel at every set of holes, start at wire tie No. 4 and working forward, removing slack at each juncture. When securing harness, do not allow contact with side flanges on channels. Always position harness between holes.

6. Determine routing of harness and secure to front frame channel rails based on burner swing door (BSD) hinge arrangement determined previously.

Harness can be secured to suit any of the following arrangements:

- a. BSD with left hand hinge arrangement - harness exits left side of jacket front panel en route to control panel.
- b. BSD with left hand hinge arrangement - harness exits right side of jacket front panel en route to control panel.

Table IX: Internal Wiring Harness Adjustment

Boiler Size	Harness Adjustment			
	Wire Tie 'A'	Wire Tie 'B'	Wire Tie 'C'	Wire Tie 'D'
4 Section	CUT	CUT	CUT	CUT
5 Section	CUT	CUT	CUT	---
6 Section	CUT	CUT	---	---
7 Section	CUT	---	---	---
8 Section	No Adjustment Required			
9 Section	CUT	CUT	CUT	CUT
10 Section	CUT	CUT	CUT	---
11 Section	CUT	CUT	---	---
12 Section	CUT	---	---	---
13 Section	No Adjustment Required			
14 Section	CUT	CUT	CUT	CUT
15 Section	CUT	CUT	CUT	---
16 Section	CUT	CUT	---	---
17 Section	CUT	---	---	---
18 Section	No Adjustment Required			

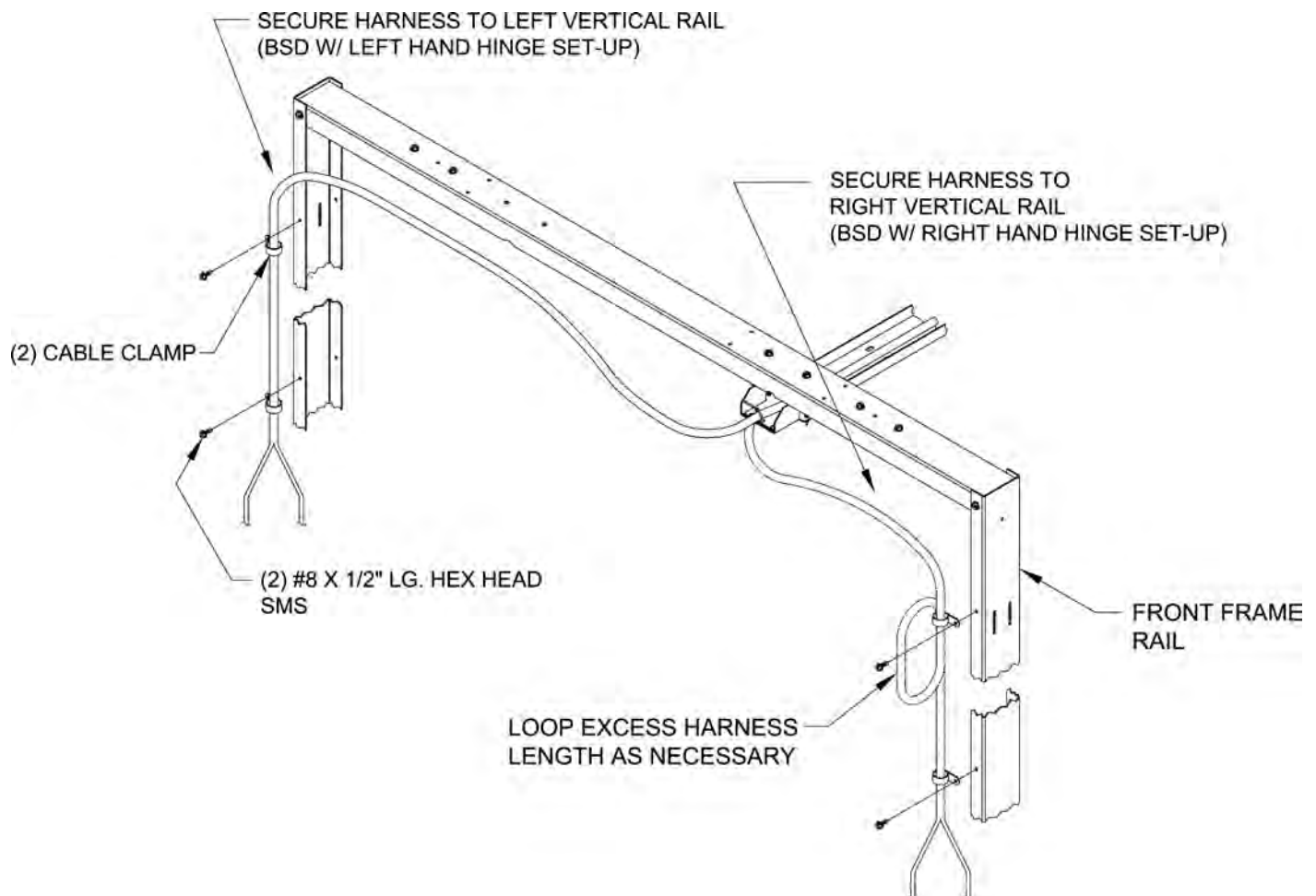


Figure 24g: Internal Wiring Harness Components - Secure Harness to Vertical Channel

- c. BSD with right hand hinge arrangement - harness exits right side of jacket front panel en route to control panel.
- d. BSD with right hand hinge arrangement - harness exits left side of jacket front panel en route to control panel.

Locate two (2) cable clamps and secure harness to vertical rails with two (2) #8 x 1/2 hex head sheet metal screws as shown in Figure 24g, clamp must be facing inward to prevent interference with jacket.

- 7. Adjust length of internal wiring harness to match boiler size, see Table IX and Figure 25 for details.

- a. 4 thru 8 section boilers are shipped with the internal harness length suitable for an 8 section boiler. To modify harness for a 7 section, cut nylon wire tie A; for a 6 section, cut A & B; for 5 section, cut A, B & C; and for a 4 section, cut A, B, C & D. Refer to Table IX and Figure 25.
- b. 9 thru 13 section boilers are shipped with the proper harness length suitable for a 13 section boiler. For boiler sizes 9 thru 12, modify harness per Table IX, also refer to Figure 25.
- c. 14 thru 18 section boilers are shipped with the proper harness length suitable for an 18 section boiler. For boiler sizes 14 thru 17, modify harness per Table IX, also refer to Figure 25.

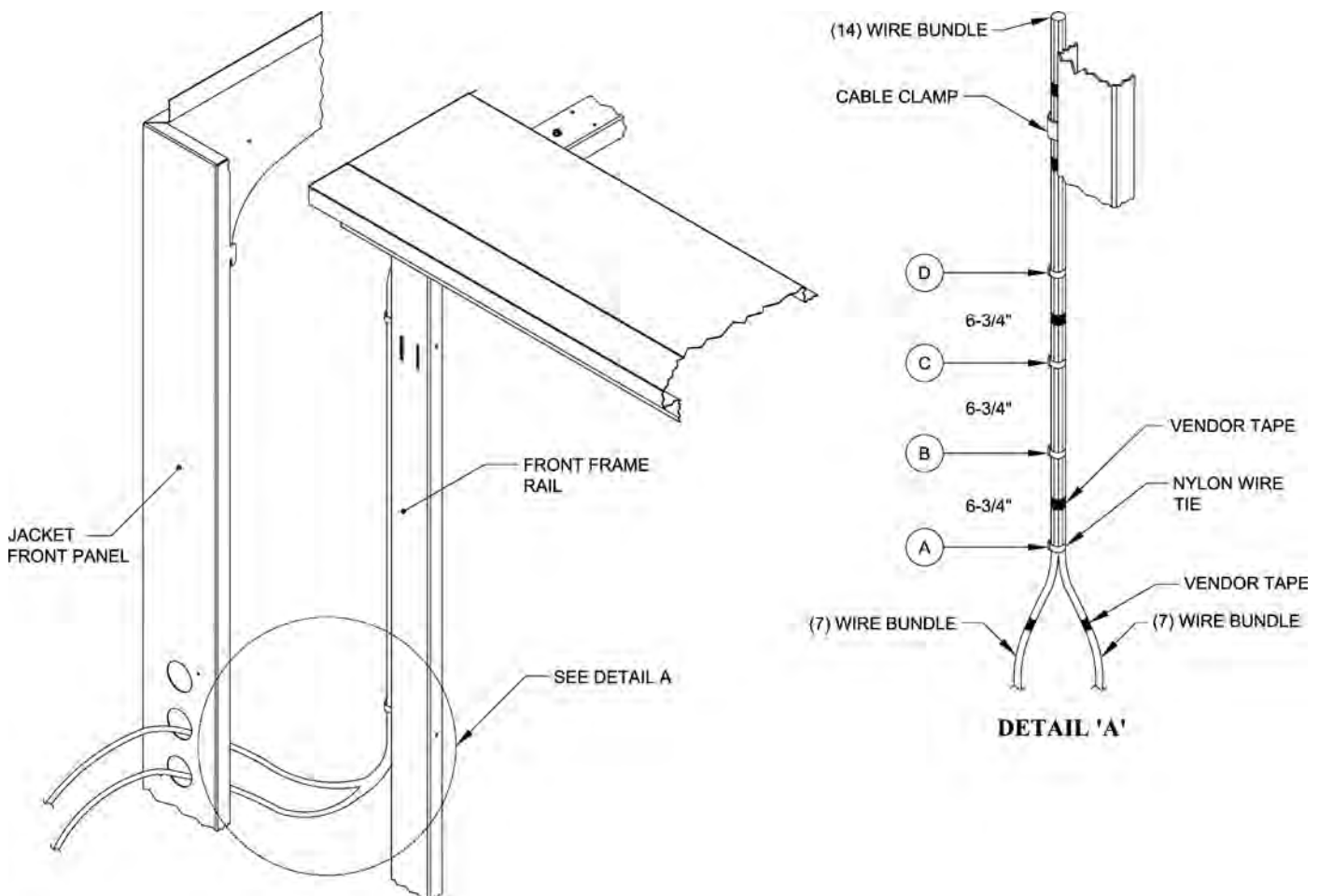


Figure 25: Internal Wiring Harness - Length Adjustment for Penetration Through Side of Jacket Front Panel

- F.** Locate Jacket Top Corner Panels packed in carton marked 'JC-2'. Install Jacket Top Corner Panels per order of assembly shown in Table X, also refer to illustration in Figure 26.

Step 1. On 4 thru 6 Section Boilers, assemble top corner panel #1 to 6¾" top corner panel #2 using two (2) #8 x ½" lg. hex head sheet metal screws, before installing on frame rails as noted in Step 2.

Step 2. Starting on the left side, at the front, secure top corner panel #1 to front horizontal and vertical frame rails with two (2) #8 x ½" lg. hex head sheet metal screws (SMS).

Step 3. Secure top corner panel #1 to next set of frame rails with two (2) #8 x ½" lg. SMS, see Figure 26, Detail A. If necessary, push or pull frame rails to align holes.

NOTE: Like the lower tie bars installed previously, these top corner panels maintain the proper distance between frame rails for assembly of remaining jacket panels.

Step 4. On 7 thru 11 Section Boilers, locate top corner panel #2 per Table X and secure to panel #1 using two (2) #8 x ½" lg. hex head SMS. Align mounting holes in panel #2 with holes in frame rails and secure with two (2) #8 x ½" lg. hex head SMS.

Table X: Jacket Top Corner / Intermediate Panel Arrangement

Boiler Size	Side of Boiler	Order of Assembly (* See Panel Designation Below)			
		Front	← Block Assembly →	Rear	
4 Section	Left	27" TCP w/J		6¾" TCP w/H	
	Right	6¾" TCP w/H		27" TCP w/J	
5 Section	Left	33¾" TCP w/J		6¾" TCP w/H	
	Right	6¾" TCP w/H		33¾" TCP w/J	
6 Section	Left	40½" TCP w/J		6¾" TCP w/H	
	Right	6¾" TCP w/H		40½" TCP w/J	
7 Section	Left	27" TCP w/J		27" TCP w/H	
	Right	27" TCP w/H		27" TCP w/J	
8 Section	Left	33¾" TCP w/J		27" TCP w/H	
	Right	27" TCP w/H		33¾" TCP w/J	
9 Section	Left	33¾" TCP w/J		33¾" TCP w/H	
	Right	33¾" TCP w/H		33¾" TCP w/J	
10 Section	Left	40½" TCP w/J		33¾" TCP w/H	
	Right	33¾" TCP w/H		40½" TCP w/J	
11 Section	Left	40½" TCP w/J		40½" TCP w/H	
	Right	40½" TCP w/H		40½" TCP w/J	
12 Section	Left	34¾" TCP w/J	27" TIP w/J	27" TCP w/H	
	Right	27" TCP w/H	27" TIP w/J	34¾" TCP w/J	
13 Section	Left	34¾" TCP w/J	27" TIP w/J	33¾" TCP w/H	
	Right	33¾" TCP w/H	27" TIP w/J	34¾" TCP w/J	
14 Section	Left	34¾" TCP w/J	33-¾" TCP w/J	33¾" TCP w/H	
	Right	34¾" TCP w/H	33¾" TIP w/J	34¾" TCP w/J	
15 Section	Left	40½" TCP w/J	33¾" TIP w/J	33¾" TCP w/H	
	Right	33¾" TCP w/H	33¾" TIP w/J	40½" TCP w/J	
16 Section	Left	40½" TCP w/J	33¾" TIP w/J	40½" TCP w/H	
	Right	40½" TCP w/H	33¾" TIP w/J	40½" TCP w/J	
17 Section	Left	33¾" TCP w/J	27" TIP w/J	27" TIP w/J	33¾" TCP w/H
	Right	33¾" TCP w/H	27" TIP w/J	27" TIP w/J	33¾" TCP w/J
18 Section	Left	33¾" TCP w/J	33¾" TIP w/J	27" TIP w/J	33¾" TCP w/H
	Right	33¾" TCP w/H	27" TIP w/J	33¾" TIP w/J	33¾" TCP w/J

* Panel Designations:

TCP w/J = Top Corner Panel w/ Joiner Bracket

TCP w/H = Top Corner Panel w/ Holes

TIP w/J = Top Intermediate Panel w/ Joiner Bracket

Step 5. On 12 thru 18 Section Boilers, locate top intermediate panel(s) #3 per Table X and secure to panel #1 and each other using two (2) #8 x 1/2" lg. hex head SMS per joint. Align mounting holes in panel(s) #3 with holes in frame rails and secure with two (2) #8 x 1/2" lg. hex head SMS per rail.

Locate top corner panel #2 per Table X and secure to last top intermediate panel #3 installed, using two (2) #8 x 1/2" lg. hex head SMS. Secure panel #2 to rear frame rails using two (2) #8 x 1/2" lg. hex head SMS.

Step 6. Repeat same procedure as Steps 1 thru 5 to install outer top panels to right side frame rails.

Note: Right side of boiler uses same panels as left side with a reverse pattern starting at the rear and working forward.

G. Locate Front Panel Shipped in Jacket Carton marked 'JC-1' - Position jacket front panel against front of boiler assembly and feed internal harness wires through holes in side of panel as shown in Figure 25.

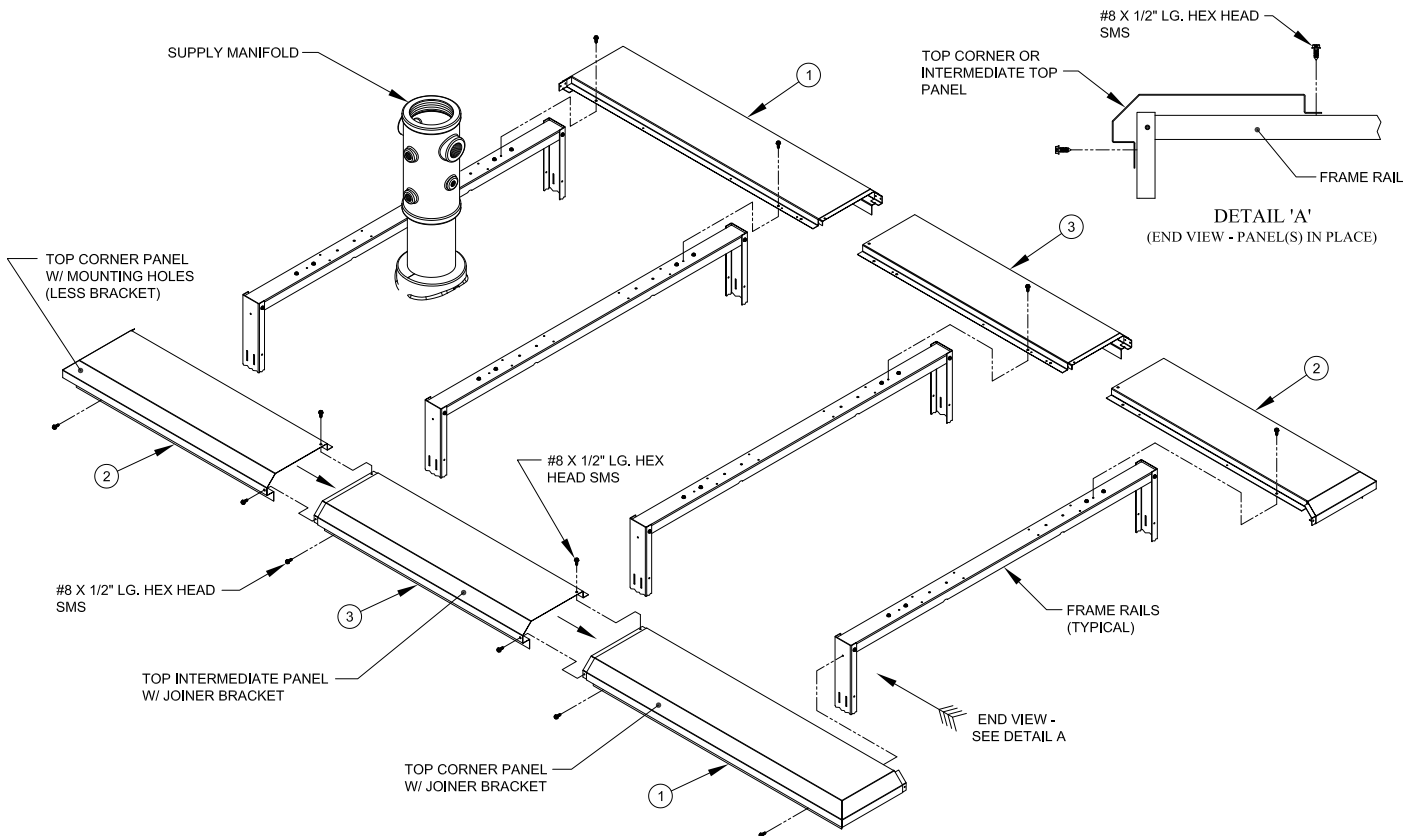


Figure 26: Install Top Corner / Intermediate Panels

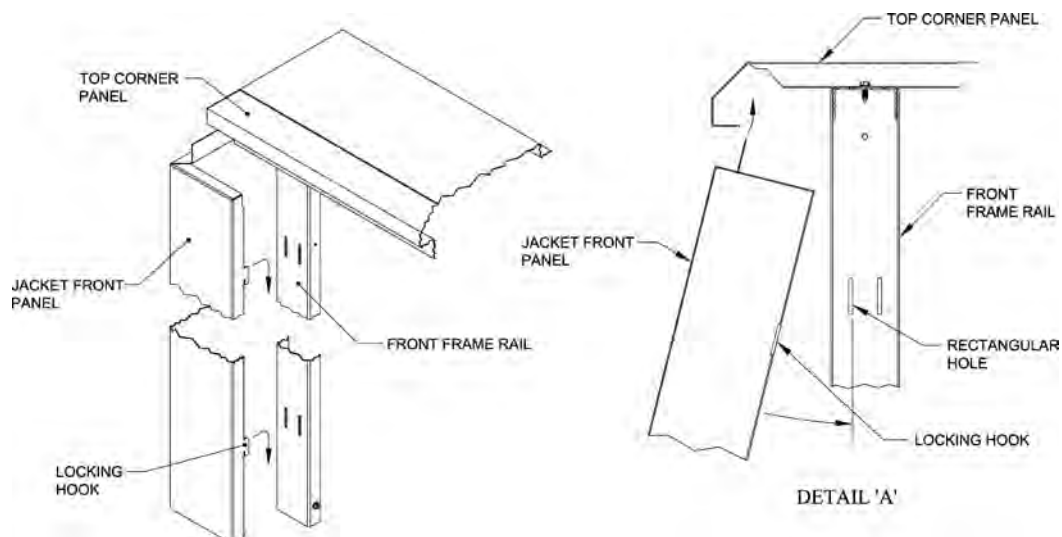


Figure 27: Install Jacket Front Panel

Install front panel by tilting on a slight angle to engage top flange behind bottom flange on jacket top corner panels installed previously, see Figure 27, Detail A. Rotate bottom of front panel until locking tabs rest against vertical frame rails. On one side only, flex side of panel until hooks clear face of vertical rail. Align top and bottom hooks with slotted holes nearest front edge. Engage both hooks and allow panel to drop down to lock in place. Repeat for opposite side.

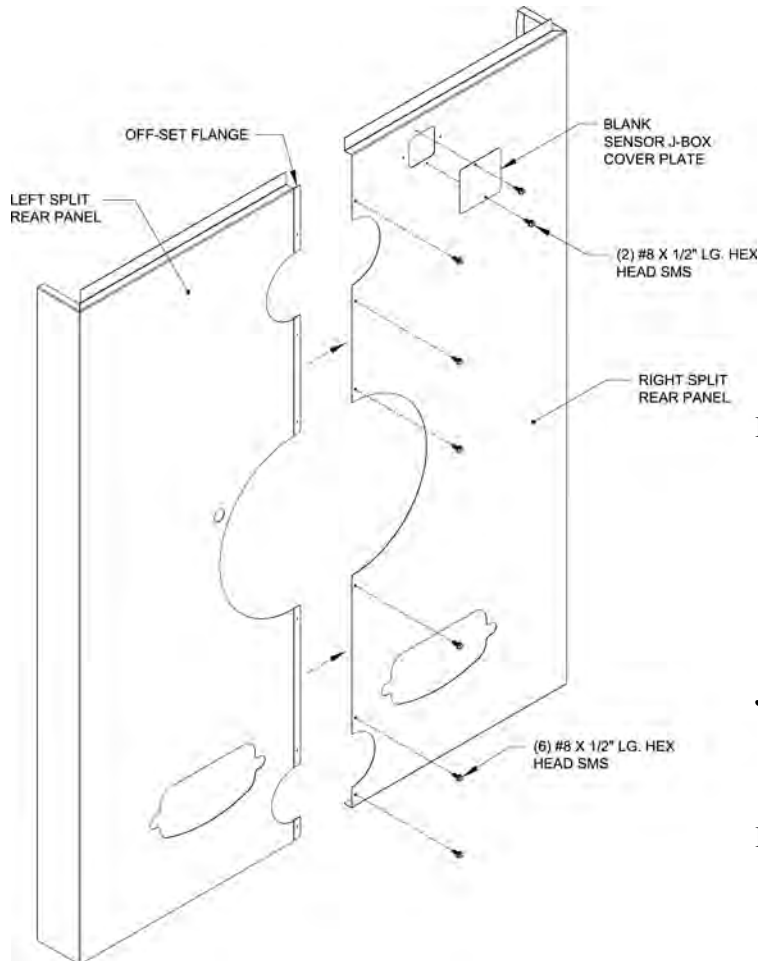


Figure 28: Jacket Split Rear Panel Detail

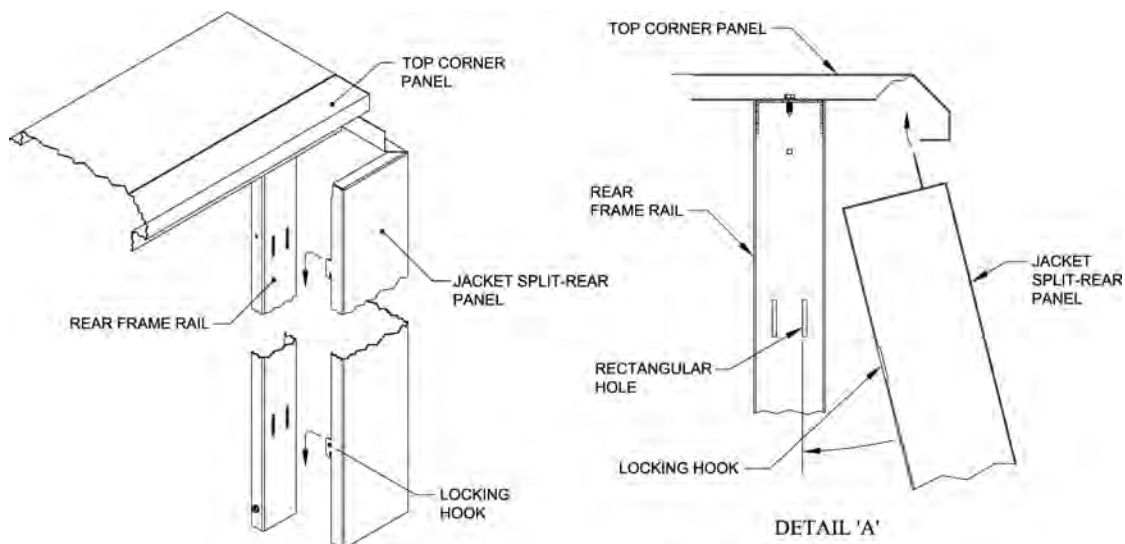


Figure 29: Install Jacket Split Rear Panel

- H.** Locate Jacket Split Rear Panel shipped in JC-1 Jacket Carton.

Note: Before installing rear panel, drain valve and indirect water heater return piping (furnished by others) should be installed now due to accessibility.

Rear panel is shipped loose in two (2) halves, see Figure 28. As viewed from rear of boiler, install left split rear panel first. Install panel by tilting on a slight angle to engage top flange behind bottom flange on jacket top corner panel, see Figure 29, Detail A. Rotate bottom of left rear panel until locking tabs rest against vertical frame rail, flex side of panel until hooks clear face of vertical rail. Align top and bottom hooks with rectangular holes nearest rear edge. Engage both hooks and allow panel to drop down to lock in place, see Figure 29. Repeat same procedure to install jacket right split rear panel, making sure that right side panel overlaps offset flange on left side panel. Secure panel seam with six (6) #8 x 1/2" lg. hex head SMS, as shown in Figure 28.

- I.** Install two (2) clean-out covers to openings at bottom of flue collector. Locate four (4) 5/16" flat washers and four (4) 5/16 -18 x 7/8" lg. cap screws from hardware bag. Thread one (1) washer and cap screw into left tapping on each opening. Engage slot on clean-out cover behind washer. Thread second cap screw with washer through slot and into tapping on opposite end. Wrench tighten hardware securely. See Figure 9.
- J.** Locate and Install Blank Sensor J-Box Cover over opening in Jacket Right Split Rear Panel as shown in Figure 28. Secure cover with two (2) #8 x 1/2" lg hex head SMS.
- K.** Locate Jacket Top Panel Carton marked 'JC-3' and remove contents. Starting in the front, install jacket front top panel first and then add consecutive panel(s) as outlined in Table XI, working toward the rear of block assembly.

Table XI: Jacket Top Panel Arrangement

Boiler Size	Order of Assembly				
	Front	←	Block Assembly	→	Rear
4 Section	22-1/4" Front Top Panel			11-3/8" Rear Top Panel	
5 Section	29" Front Top Panel			11-3/8" Rear Top Panel	
6 Section	35-3/4" Front Top Panel			11-3/8" Rear Top Panel	
7 Section	22-1/4" Front Top Panel		20-1/4" Intermediate Top Panel		11-3/8" Rear Top Panel
8 Section	22-1/4" Front Top Panel		27" Intermediate Top Panel		11-3/8" Rear Top Panel
9 Section	29" Front Top Panel		27" Intermediate Top Panel		11-3/8" Rear Top Panel
10 Section	29" Front Top Panel		33-3/4" Intermediate Top Panel		11-3/8" Rear Top Panel
11 Section	35-3/4" Front Top Panel		33-3/4" Intermediate Top Panel		11-3/8" Rear Top Panel
12 Section	29" Front Top Panel	27" Intermediate Top Panel	20-1/4" Intermediate Top Panel		11-3/8" Rear Top Panel
13 Section	29" Front Top Panel	27" Intermediate Top Panel	27" Intermediate Top Panel		11-3/8" Rear Top Panel
14 Section	35-3/4" Front Top Panel	27" Intermediate Top Panel	27" Intermediate Top Panel		11-3/8" Rear Top Panel
15 Section	29" Front Top Panel	33-3/4" Intermediate Top Panel	33-3/4" Intermediate Top Panel		11-3/8" Rear Top Panel
16 Section	35-3/4" Front Top Panel	33-3/4" Intermediate Top Panel	33-3/4" Intermediate Top Panel		11-3/8" Rear Top Panel
17 Section	29" Front Top Panel	27" Intermediate Top Panel	27" Intermediate Top Panel	27" Intermediate Top Panel	11-3/8" Rear Top Panel
18 Section	35-3/4" Front Top Panel	27" Intermediate Top Panel	27" Intermediate Top Panel	27" Intermediate Top Panel	11-3/8" Rear Top Panel

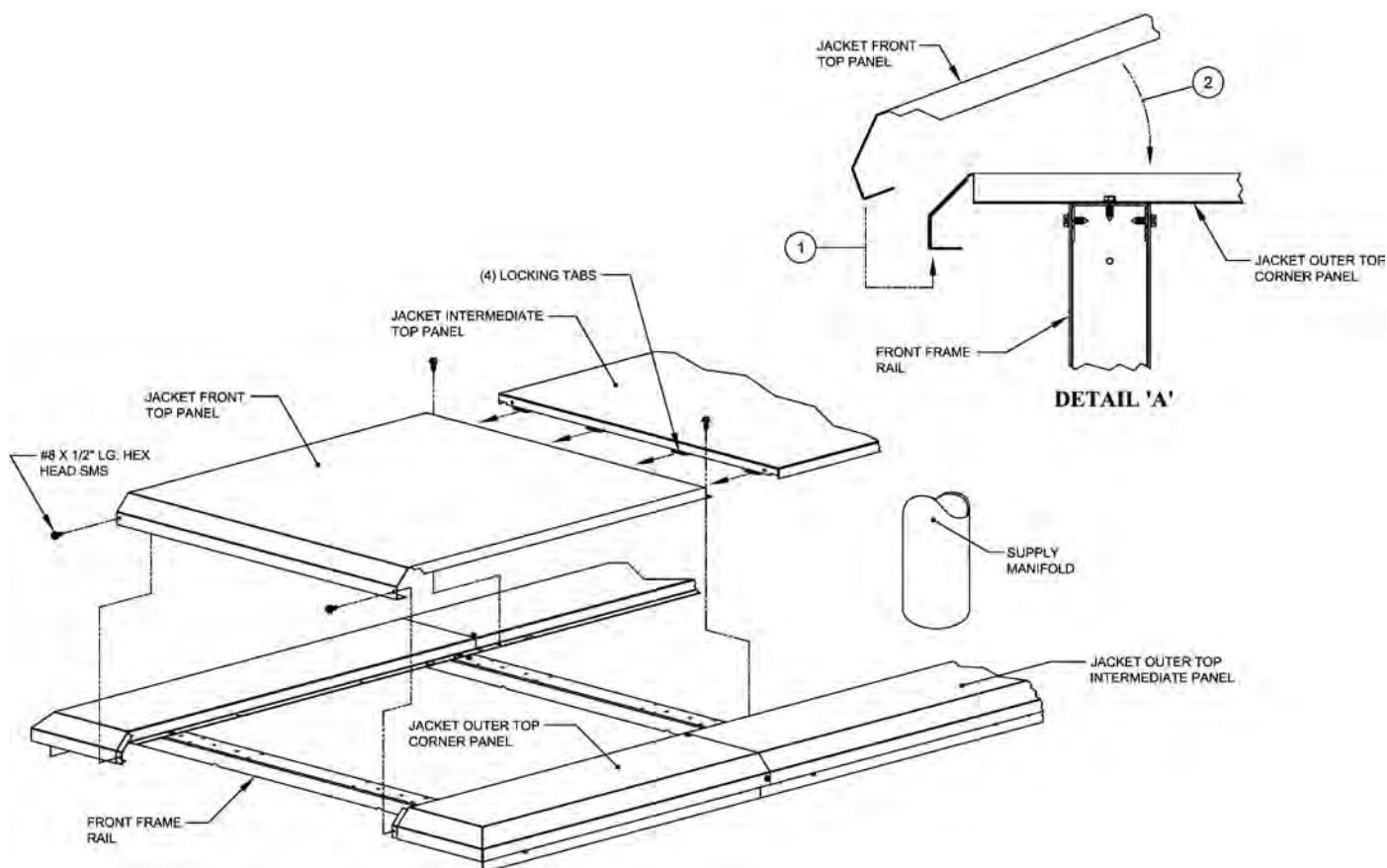


Figure 30a: Installing Jacket Top Panels - Viewed From Front

Step 1. Position front panel at approximately 30° angle, hook front flange under clips on outer top corner panels as shown in Figure 30a, Detail A, Step 1. Lower rear of panel into position between outer

top corner panel and secure front flange to clips with two (2) #8 x 1/2" lg. hex head SMS as shown in Figure 30a. Secure rear flange to outer top corner panels with two (2) #8 x 1/2" lg. SMS as shown in Figure 30b.

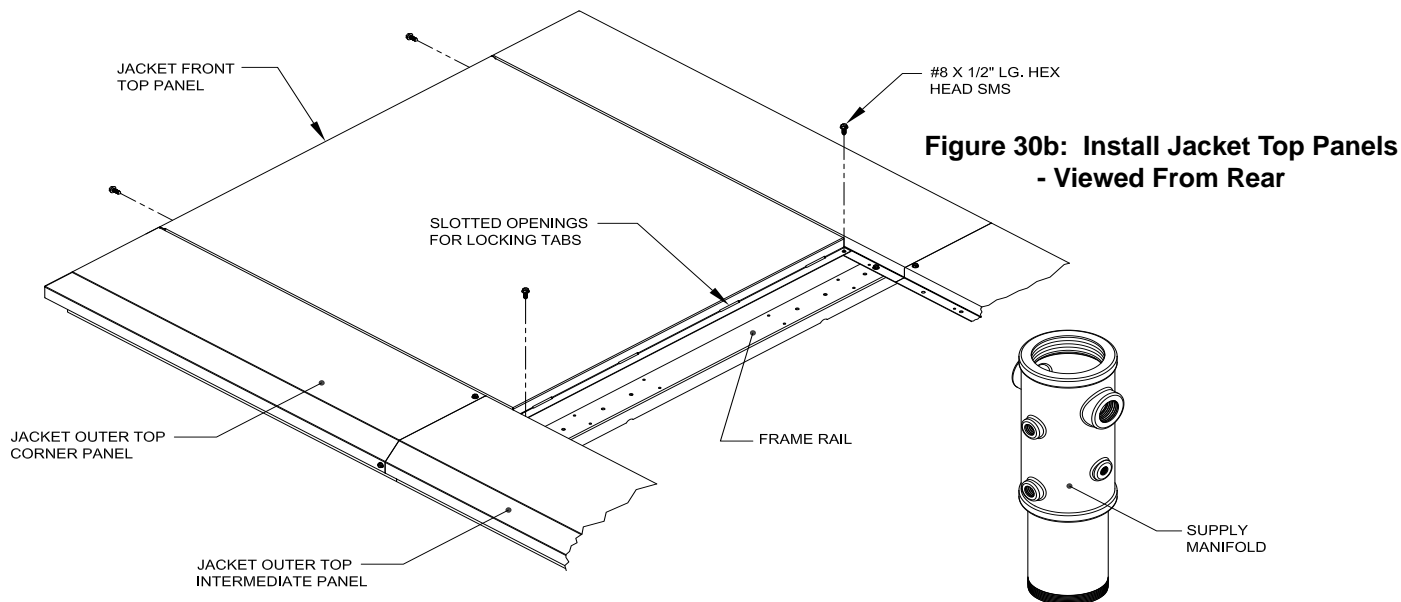


Figure 30b: Install Jacket Top Panels - Viewed From Rear

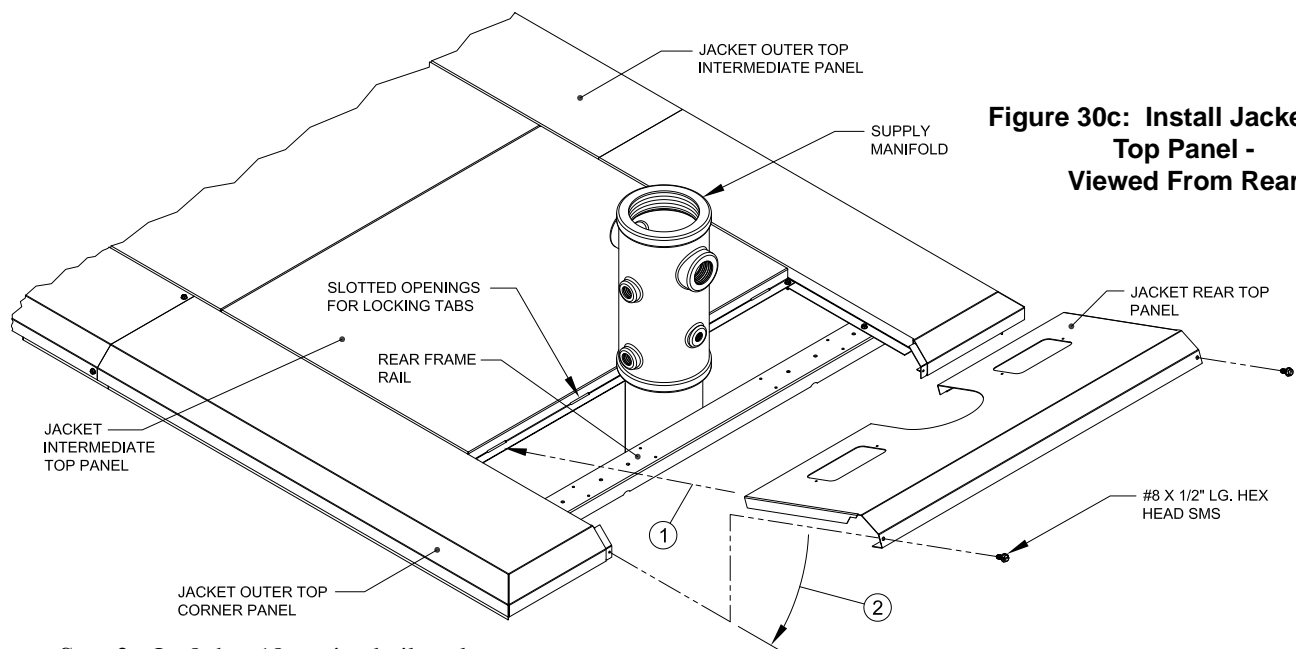


Figure 30c: Install Jacket Rear Top Panel - Viewed From Rear

Step 2. On 8 thru 18 section boilers, locate intermediate top panel(s) and install in order of assembly shown in Table XI. Position panel between outer top corner panes. Slide forward to engage locking tabs into slotted openings on previously installed panel, see Figure 30b. Secure rear flange with two (2) #8 x 1/2" lg SMS. Repeat until intermediate panels reach supply manifold.

Step 3. Position jacket rear top panel between outer top corner panels behind supply manifold. Slide forward until locking tabs are engaged into slotted openings on previously installed panel. Secure panel to rear clips on outer corner panels with two (2) #8 x 1/2" lg. SMS. Refer to Figure 30c.

- L.** Install Burner Swing Door (BSD) on Block Assembly hinges, see Figure 31. Move BSD to front of boiler. Position door on the Floor, standing up, perpendicular to front of boiler (full open position).

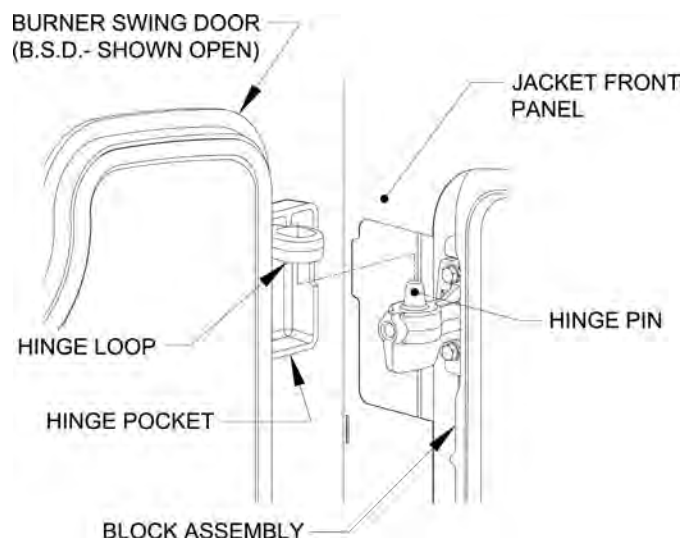


Figure 31: Install Burner Swing Door

Important Product Safety Information

Refractory Ceramic Fiber Product

Warning:

The Repair Parts list designates parts that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to temperatures about 1805°F, such as during direct flame contact, RCF changes into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health.

AVOID Breathing Fiber Particulates and Dust

Precautionary Measures:

Do not remove or replace RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
 2. Long sleeved, loose fitting clothing
 3. Gloves
 4. Eye Protection
- Take steps to assure adequate ventilation.
 - Wash all exposed body areas gently with soap and water after contact.
 - Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
 - Discard used RCF components by sealing in an airtight plastic bag. RCF and crystalline silica are not classified as hazardous wastes in the United States and Canada.

First Aid Procedures:

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.

Lift door high enough to move hinge pockets through opening in jacket front panel. Engage hinge loop attached to door over hinge pin attached to block assembly. Lower door to rest weight on hinge pin brackets.

M. Locate Flueway Baffle Carton(s) marked '2FB' and '3FB' and remove contents. Check Equipment Check List for proper baffle length and usage per boiler size.

1. On 4 thru 11 Section Boilers - Install four (4) third pass baffles into third pass flueways until handle is flush with face of casting as shown in Figure 32, Detail A.

2. On 4 thru 18 Section Boilers - Install four (4) second pass baffles into second pass flueways until handle is flush with face of casting as shown in Figure 33, Detail A.

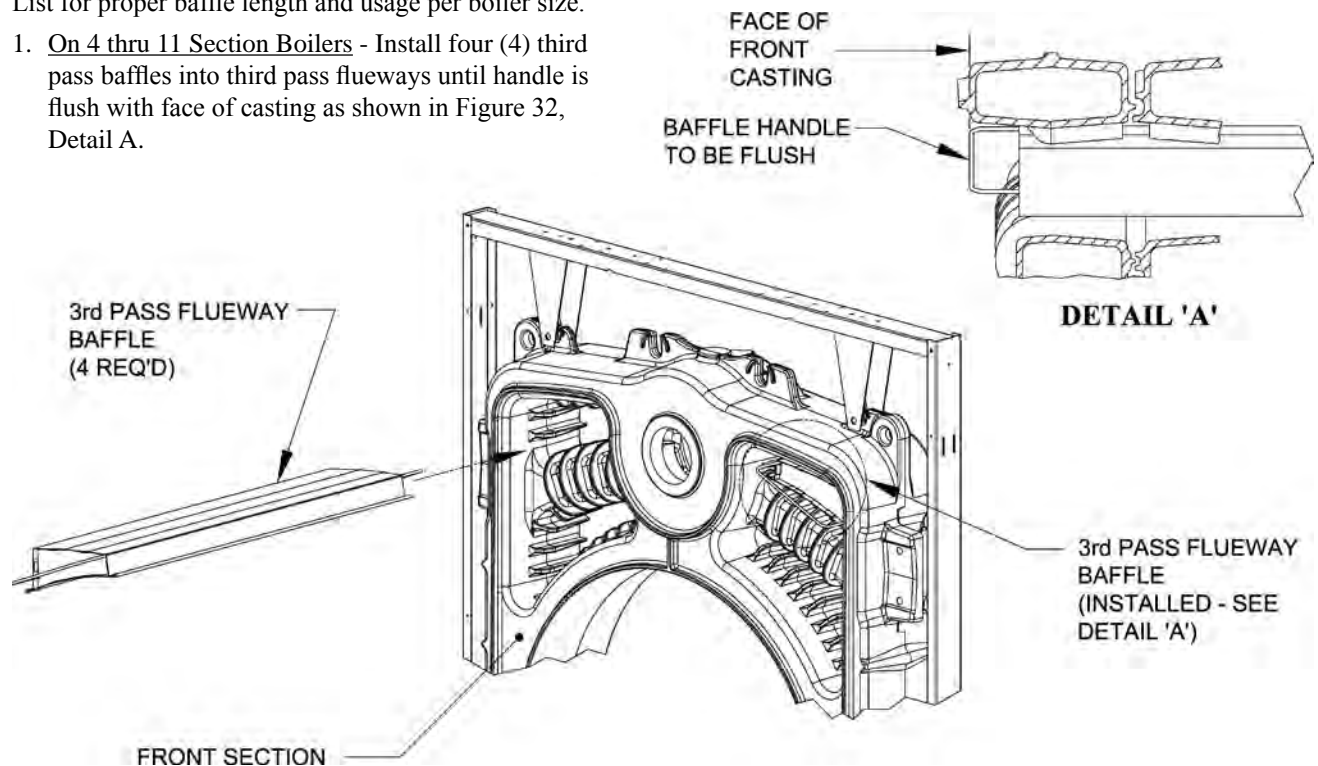


Figure 32: Install 3rd Pass Flueway Baffles (4 thru 11 Section Boilers Only)

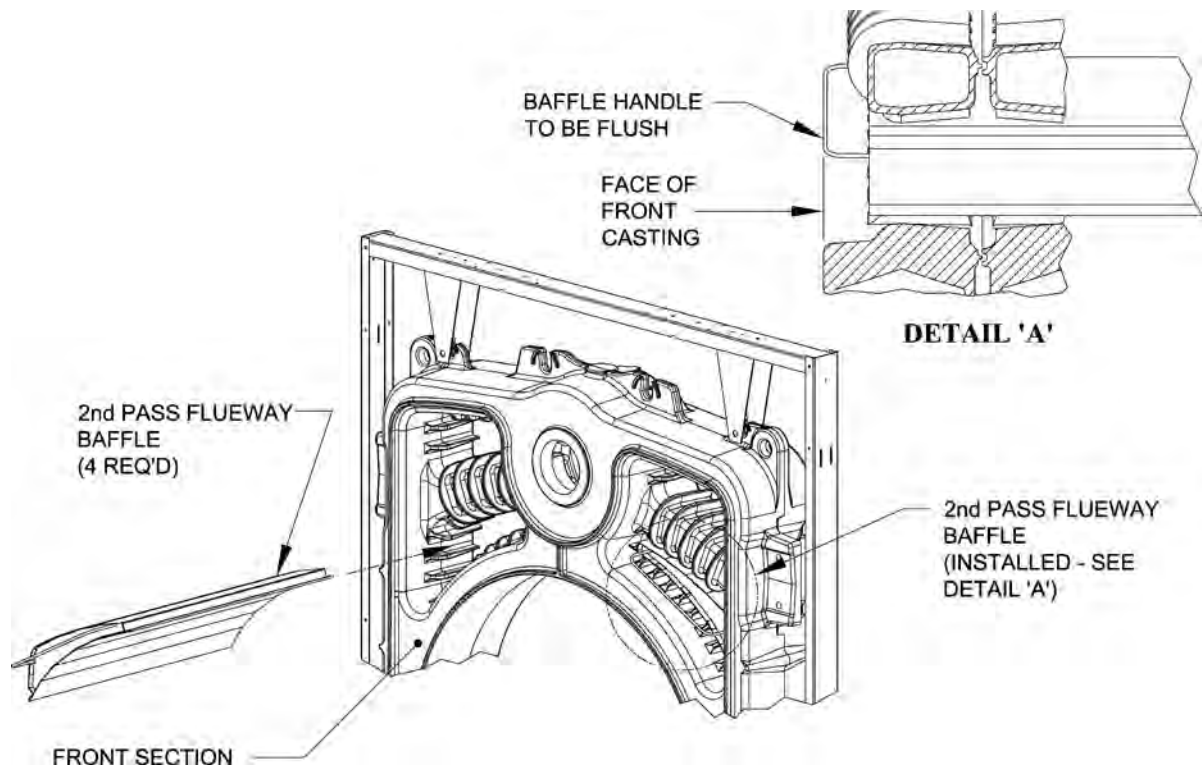


Figure 33: Install 2nd Pass Flueway Baffles

N. Close Burner Swing Door and secure using (4) 5/8" flat washers, (4) 9/16" lock washers and (4) 9/16 - 12 x 2" lg. cap screws as shown in Figure 34. There are (4) points of internal contact around perimeter of BSD and Front Section. These stop the door travel when tightening hardware to prevent excess compression of rope gasket. Therefore, continued tightening of hardware will only bend the hinge pockets. Use a hand wrench to tighten the hardware. Use an alternating tightening method from right side to left side cap screws to secure door until sealed without applying

excessive torque. Never tighten hardware on either side 100% without using the alternating tightening method.

Failure to follow the prescribed procedure could cause thread damage, a crack in the casting or a leak in the door seal.

O. Mount Burner Adapter Plate to Burner Swing Door, refer to Figures 35 and 36.

Also, refer to Burner Installation Manual for mounting instructions specific to each burner (provided with burner).

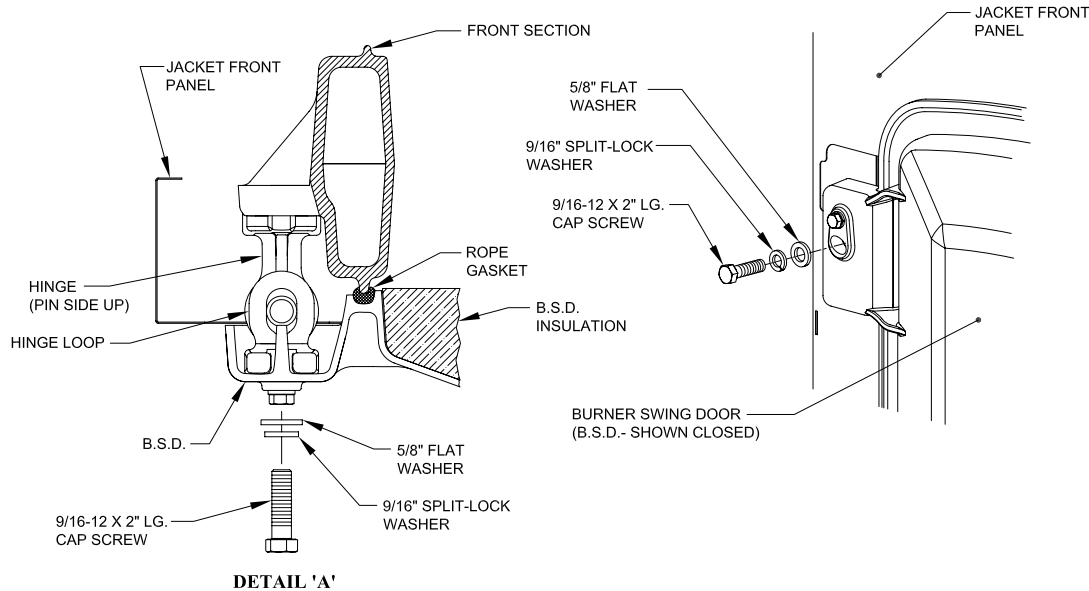


Figure 34: Secure Burner Swing Door for Tight Perimeter Seal

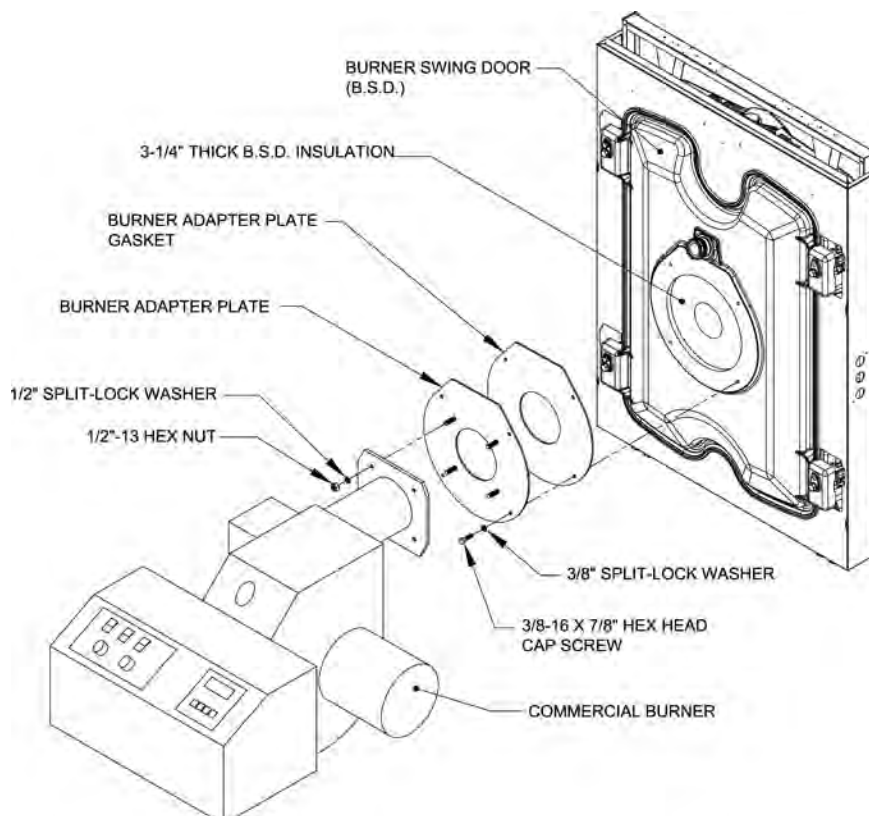
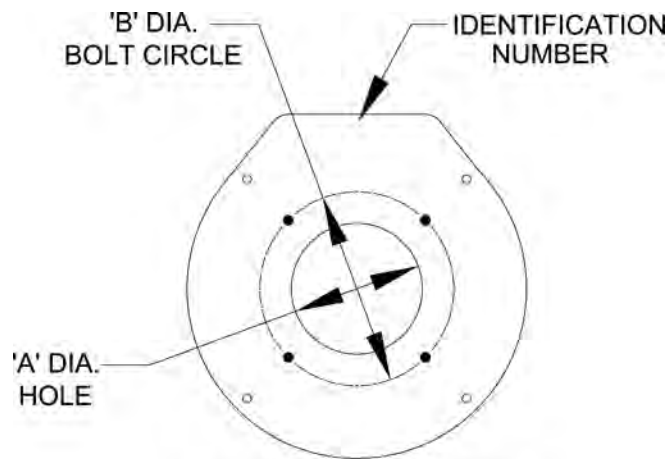


Figure 35: Install Burner Adapter Plate and Burner to Burner Swing Door



STANDARD BURNER ADAPTER PLATE

Figure 36: Burner Adapter Plate Options

Power Flame ('C' Series) Burner Adapter Plate

Boiler Model	Part No.	I.D. No.	'A'	'B'
MPC4 thru MPC7	602263401	40	7-1/2	10-1/4
MPC8 thru MPC14	602263411	41	9	12
MPC15 thru MPC18	602263421	42	10-3/8	14-1/8

Power Flame ('JR' Series) Burner Adapter Plate

Boiler Model	Part No.	I.D. No.	'A'	'B'
MPC4 thru MPC7	602263451	45	6-3/8	10-1/4
MPC8 thru MPC11	602263461	46	8-3/8	11-11/16

Beckett ('CF' Series) Burner Adapter Plate

Boiler Model	Part No.	I.D. No.	'A'	'B'
MPC4 thru MPC7	602263001	00	6-3/4	10
MPC8 thru MPC15	602263011	01	8-1/4	10
MPC16 thru MPC18	602263021	02	10-1/4	11

Beckett ('CG' Series) Burner Adapter Plate

Boiler Model	Part No.	I.D. No.	'A'	'B'
MPC4 and MPC5	602263031	03	5	10
MPC6 and MPC7	602263041	04	6	10
MPC8 thru MPC11	602263071	07	7-1/4	10
MPC12 thru MPC18	602263081	08	8-1/8	11

1. In most cases the burner adapter plate carton for the specified burner will be provided by Burnham.
2. If adapter is provided by Burnham, open carton and remove contents. Apply four (4) small dabs of silastic on rear surface of adapter plate to temporarily hold gasket in place. Hold adapter plate in position against burner swing door, align holes and secure with four (4) 3/8" lock washers and 3/8" - 16 x 7/8" lg. cap screws.
3. If adapter is furnished with burner, follow manufacturer's instructions using gasket material and hardware provided with burner.
4. **USE A HOLE SAW OR KNIFE TO CUT BURNER SWING DOOR INSULATION TO MATCH HOLE SIZE ON BURNER ADAPTER PLATE.** After cutting, remove any and all loose pieces of insulation which may become lodged or interfere with the head of the burner air tube after insertion.
5. Secure burner to adapter plate with four (4) 1/2" lock washers and four (4) 1/2" - 13 hex nuts provided.

CAUTION

Failure to properly fill all gaps between the insulation and burner blast tube may result in damage to the burner.

6. Confirm that hole in insulation fits snugly around burner blast tube. If hole is oversized, open burner swing door (with burner attached) to access burner blast tube. Use additional fiberglass rope gasket provided with burner to fill in any space between insulation and blast tube. If additional rope gasket is not provided with the burner, use 3/8" fiberglass rope rated for 2300°F (provided by others).
When finished, close burner swing door and secure hardware.
- P. Connect Internal Control / Safety Circuit Wiring Harness to Burner Controls, see Figures 25 and 37. Also, refer to Burner Installation Manual and wiring diagrams provided with burner.

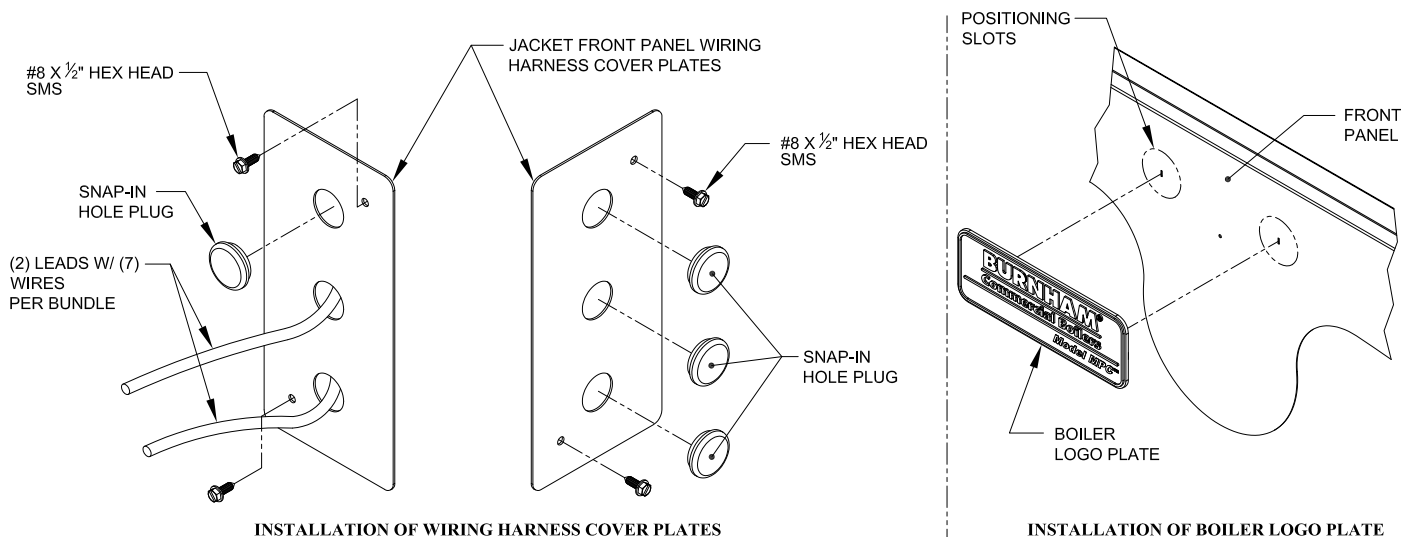


Figure 37: Install Jacket Front Panel Harness Cover Plates and Logo Plate

1. Harness is split into two (2) 7 wire bundles that exit side of front panel as shown in Figure 25.
2. Each seven (7) wire harness bundle must be encased in flexible conduit from cover plate to burner control panel or junction box.
3. Locate front panel cover plates in JC-1 carton.
4. Determine routing, length and type of 'BX' connectors to be used on flexible conduit.
5. Mount 'BX' connector and flexible conduit to one (1) front panel cover plate. Pull wire bundles through conduit.
6. Secure cover plate to side of jacket front panel using (2) #8 x 1/2" lg. hex head SMS.
7. Locate and install one (1) plastic hole plug (provided) into unused 7/8" dia. hole in cover plate.
8. Install remaining cover on opposite side of front panel. Secure with #8 x 1/2" lg. hex head SMS, push (3) plastic hole plugs into 7/8" dia. holes.

9. Connect other end of flexible conduit to burner control panel or junction box. Connect control/safety circuit wires to appropriate terminals per wiring diagram provided with burner.

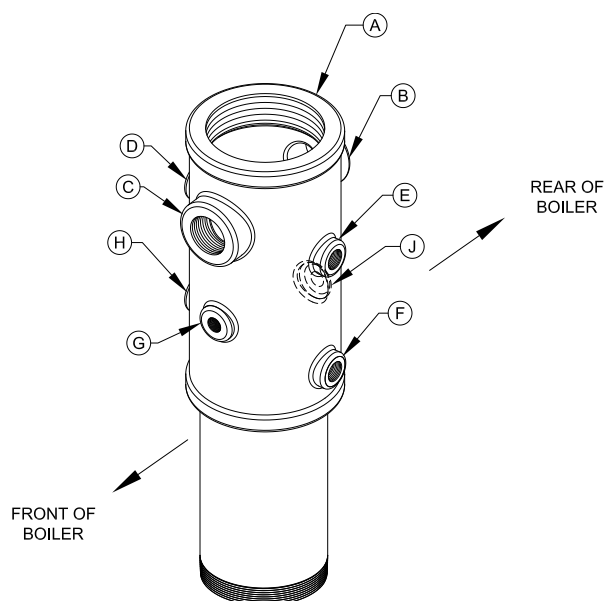
- Q.** Install Logo Plate on Jacket Front Panel if Optional Jacket Split Burner Swing Door Cover Panels are **not** to be used.

Locate Logo Plate shipped in Instruction Envelope. Peel paper off adhesive strips and install by inserting positioning tabs on rear of Logo Plate into slotted openings located at top of front panel shown in Figure 37.

If optional BSD cover panels are used, Logo Plate will be installed on the cover as instructed in later steps.

- R.** Locate Water Trim and Control Carton marked 'WT' and remove contents. Check Equipment Check List for proper working pressure/relief valve. Install standard trim and controls as follows:

1. See Figure 38 for purpose of tappings on supply manifold.



* Location	Size of Tapping	Purpose of Tapping
A	4" Flange	Supply
B	1 1/2"	Relief Valve
C	1 1/2"	Auxiliary Tapping (Plug)
D	3/4"	Operating Temperature Limit Control
E	3/4"	Probe L.W.C.O.
F	3/4"	High Temperature Limit Control / Manual Reset
G	1/2"	Temperature / Pressure Gauge
H	3/4"	Low / High / Low or Modulating Control
J	1/2"	Low Fire Hold Control

* Supply Manifold must be installed with 1 1/2" coupling 'B' or 'C' aligned with front of boiler when water tight.

Figure 38: Purpose of Tappings in Supply Manifold

Note: Supply manifold must be installed with 1½" couplings aligned with front and rear axis of boiler.

2. Apply thread sealant and install temperature/pressure gauge into tapping 'G', see Figures 38 and 39. Wrench until water tight. Tighten gauge using hex on stem, do not tighten or apply pressure to case.
3. Apply thread sealant and install relief valve and pipe fittings in Tapping 'B', see Figure 38. Fittings should be arranged as shown in Figure 39. By code, relief valve must be installed vertically. Based on vent pipe arrangement and access, relief valve can be installed with discharge facing a left or right.

4. Apply thread sealant to 3/4" immersion well and install in tapping 'D' as shown in Figure 38. Wrench well until water tight.
5. Locate L4006A Operating Control and remove knockout on casing closest to mounting hole. Connect end of harness with forked terminals to casing knockout. Connect wires to terminal on limit control, wires are interchangeable. Refer to Figure 39.
6. Connect opposite end of L4006A Operating Control Harness to right side junction box cover 'A', hole location #1 as shown in Figure 40.
7. Locate mating connectors labeled "operating control" inside right junction box. Join mating

connectors which are polarized and lock together. Lightly tug on connectors to make sure they are secure.

8. If no other controls are being installed at this time, secure Cover 'A' and Cover 'B' to jacket rear top panel with two (2) #8 x 1/2" lg. hex head SMS per cover. Install 7/8" knockout plugs (provided) to all unused holes, refer to Figure 40.

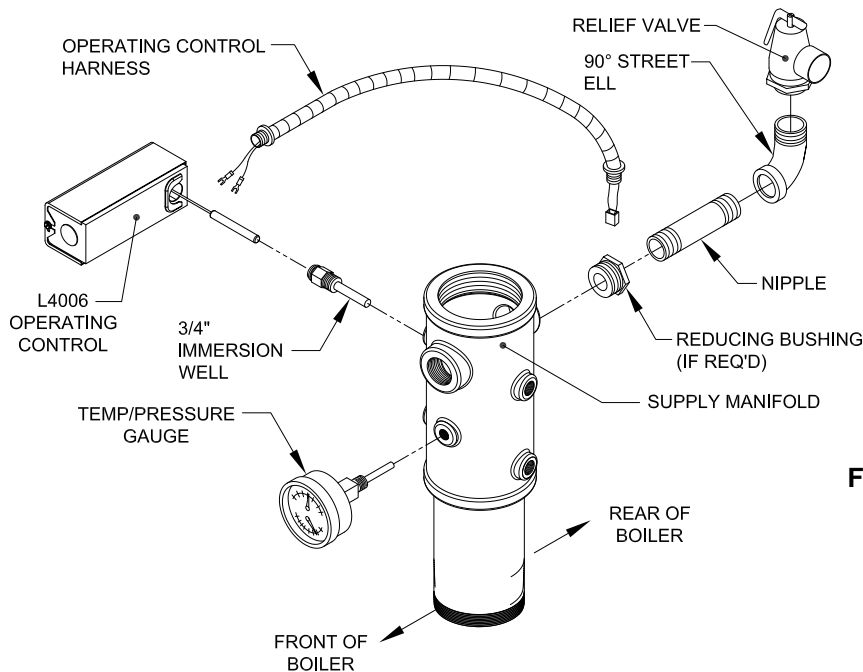


Figure 39: Install Standard Trim and Operating Control

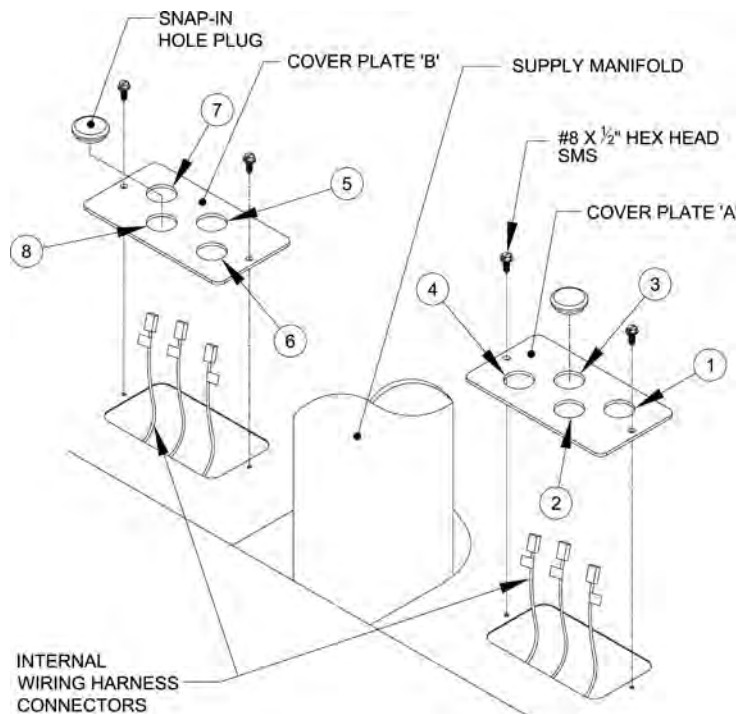


Figure 40: Control Connections to Internal Wiring Harness

S. Installing Optional Controls (if applicable):

1. Install M&M 750P-MT-120 Probe Low Water Cut Off (LWCO)

- a. Apply thread sealant to 3/4" probe and install in Tapping 'E', see Figure 38. Wrench hex until water tight.
- b. Remove 2nd knockout from bottom of M&M 750P LWCO control case. Connect end of harness with forked terminals to casing knockout, see Figure 41. Connect wires to terminal block as follows:
Terminal 1 - Black Wire w/ Red Tracer
Terminal 2 - Pink Wire
Terminal 3 - Red Wire w/ Black Tracer
Terminal 4 - Brown Wire
Terminal 5 - Violet Wire
- c. Mount LWCO Control on probe and tighten screws.
- d. Connect ring terminal on black probe wire from circuit board to terminal on probe and tighten wing nut.
- e. Connect opposite end of M&M 750P LWCO control harness to left side junction box cover 'B', hole location #7 as shown in Figure 40.
(It may be necessary to clip the conduit connector nut and flex it slightly to slide it over the control harness connectors. Nut should still be able to be tightened against cover plate.)
- f. Locate mating connectors labeled "LWCO Power" and "LWCO Contacts" inside left junction box. Join mating connectors which are polarized and lock together. Lightly tug on connectors to make sure they are secure.
- g. Proceed to next control option listed below for installation details. If no other controls are being installed at this time, secure cover 'A' and cover 'B' to jacket rear top panel with two (2) #8 x 1/2" lg. hex head SMS per cover.

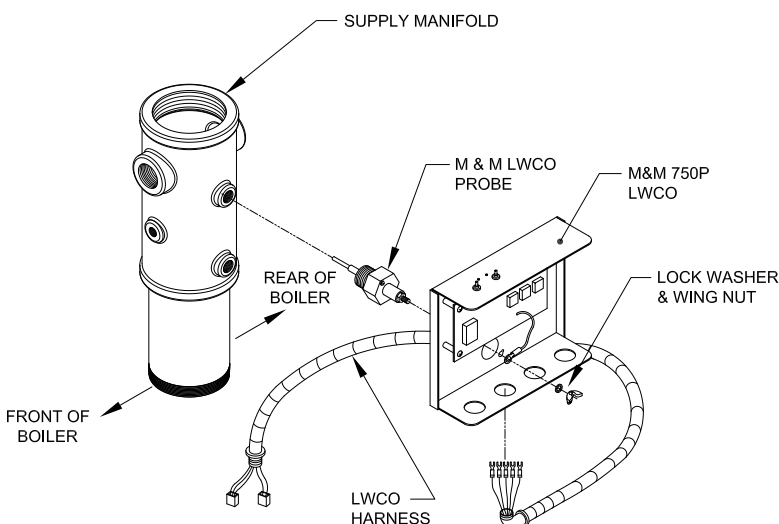


Figure 41: Install Probe Low Water Cut Off

Install 7/8" knockout plugs (provided) to all unused holes, refer to Figure 40.

2. Install High Limit Control w/Manual Reset (L4006E)

- a. Apply thread sealant to 3/4" immersion well and install in Tapping 'F' as shown in Figure 38. Wrench well until water tight.
- b. Locate L4006E High Limit Control and remove knockout on casing closest to mounting hole. Connect end of harness with forked terminals to casing knockout. Connect orange wires to terminals on limit control, wires are interchangeable. Refer to Figure 42.

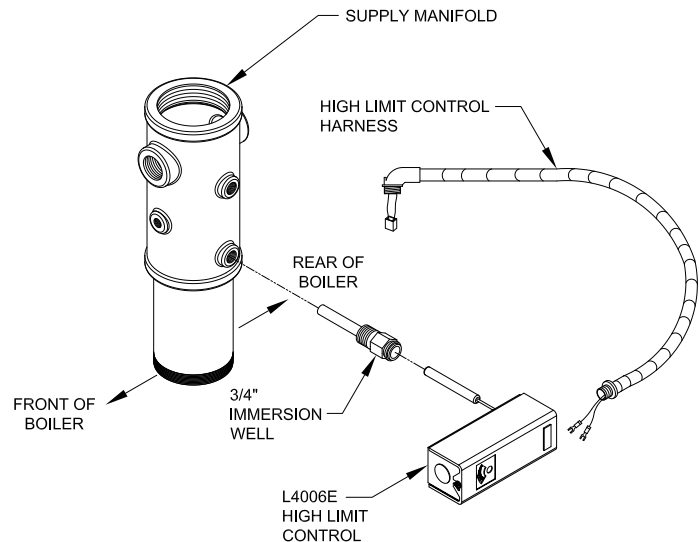


Figure 42: Install High Limit Control

- c. Connect opposite end of L4006E High Limit Control harness to left side junction box cover 'B', hole location #5 as shown in Figure 40.
 - d. Locate mating connector labeled "Limit" inside left junction box. Join mating connectors which are polarized and lock together. Lightly tug on connectors to make sure they are secure.
 - e. Proceed to next appropriate control option listed below for installation details. If no other controls are being installed at this time, secure Cover 'A' and Cover 'B' to jacket rear top panel with two (2) #8 x 1/2" lg. hex head SMS per cover. Install 7/8" knockout plugs (provided) to all unused holes, refer to Figure 40.
- 3. Install Low Fire Hold Control (L4006B)**
- a. Apply thread sealant to 1/2" immersion well and install in Tapping 'J' as shown in Figure 38. Wrench well until water tight.
 - b. Locate L4006B Low Fire Hold control and remove knockout on casing closest to mounting hole. Connect end of harness with forked terminals to casing knockout. Connect blue wires to terminals on limit control, wires are interchangeable. Refer to Figure 43.

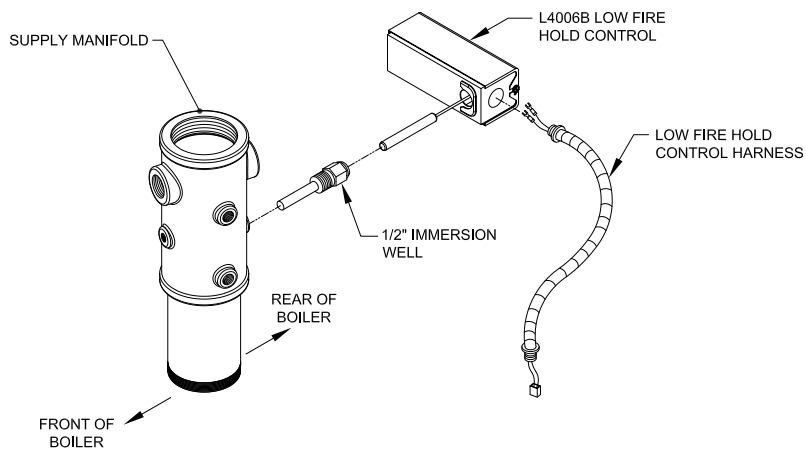


Figure 43: Install Low Fire Hold Control

- c. Connect opposite end of L4006B Low Fire Hold Control harness to right side junction box cover 'A', hole location #2 as shown in Figure 40.
 - d. Locate mating connector labeled "Low Fire Hold" inside right junction box. Join mating connectors which are polarized and lock together. Lightly tug on connectors to make sure they are secure.
 - e. Proceed to next appropriate control option listed below for installation details. If no other controls are being installed at this time, secure Cover 'A' and Cover 'B' to jacket rear top panel with two (2) #8 x 1/2" lg. hex head SMS per cover. Install 7/8" knockout plugs (provided) to all unused holes, refer to Figure 40.
4. Install Low/High/Low Control or Modulating Control

- a. Install **Low/High/Low** Control as follows (for modulating control, proceed to Step b):
 - i. Apply thread sealant to 3/4" immersion well and install in Tapping 'H' as shown in Figure 38. Wrench well until water tight.
 - ii. Locate L4006A Low/High/Low Control and remove knockout on casing closest to mounting hole. Connect end of harness with forked terminals to casing knockout. Connect black and gray wires to terminals on Low/High/Low Control, wires are interchangeable. Refer to Figure 44.
 - iii. Connect opposite end of L4006A Low/High/Low Control harness to junction box cover 'A', hole location #4 as shown in Figure 40.
 - iv. Locate mating connector labeled "LO-HI-LO/MOD" inside right junction box. Join mating connectors which are polarized and lock together. Lightly tug on connectors to make sure they are secure.
 - v. Proceed to next appropriate control option listed below for installation details. If no other controls are being installed at this time, secure Cover 'A' and Cover 'B' to jacket rear top panel with two (2) #8 x 1/2"

lg. hex head SMS per cover. Install 7/8" knockout plugs (provided) to all unused holes, refer to Figure 40.

b. Install **Modulating** Control as follows:

- i. Apply thread sealant to 3/4" immersion well and install in Tapping 'H' as shown in Figure 38. Wrench well until water tight.
- ii. Locate T991A Modulation control and remove knockout on casing closest to temperature control knob. Connect end of harness with forked terminals to casing knockout.

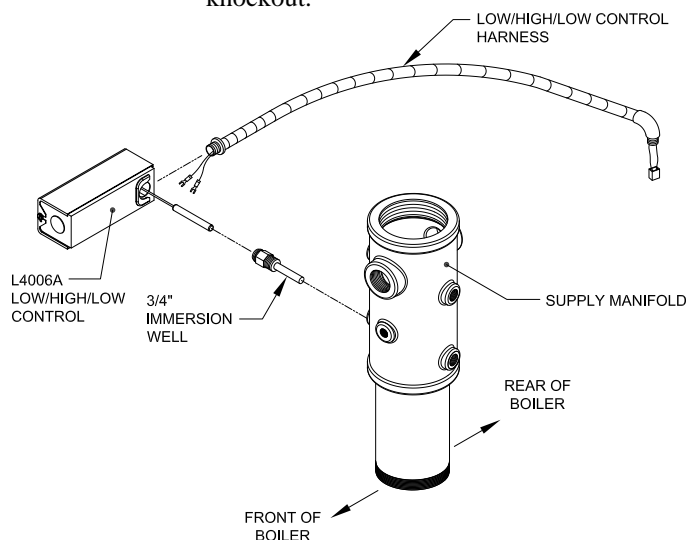


Figure 44: Install Low/High/Low Control

Connect wires to terminals as follows:

B Terminal - Black Wire w/White Tracer

W Terminal - Gray Wire

R Terminal - Red Wire w/White Tracer

- iii. Install Remote Sensing Bulb into control well and secure with retaining clip. Coil excess sensor tubing as shown in Figure 45.
- iv. Mount T991A Control to rear panel on left side of return manifold with two (2) self drilling #8 x 1/2" lg. hex head SMS (provided) as shown in Figure 45.

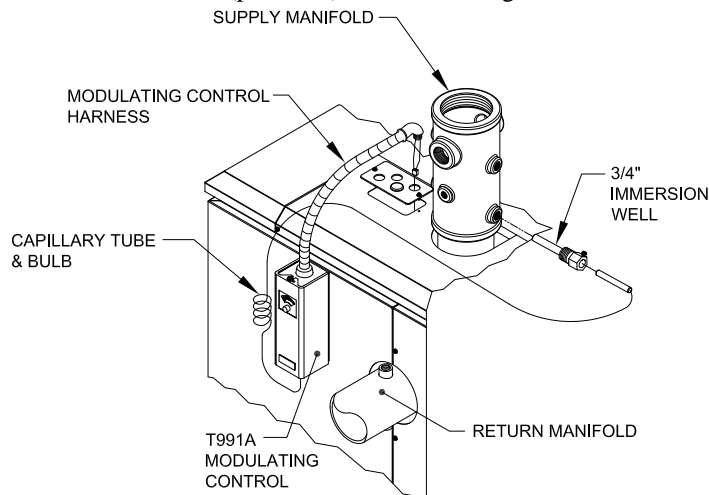


Figure 45: Install Modulation Control

- v. Connect opposite end of T991A Modulating Control harness to right side junction box cover 'A', hole location #4 as shown in Figure 40.
- vi. Locate mating connector labeled "LO-HI-LO/MOD" inside right junction box, see Figure 40. Join mating connectors which are polarized and lock together. Lightly tug on connectors to make sure they are secure.
- vii. If no other controls are being installed at this time, secure Cover 'A' and Cover 'B' to jacket rear top panel with two (2) #8 x 1/2" lg. hex head SMS per cover. Install 7/8" knockout plugs (provided) to all unused holes, refer to Figure 40.

T. Install Flue Outlet Damper Assembly, see Figure 46.

1. Locate flue outlet damper carton, as applicable (see Table below). Open carton remove a flue outlet damper assembly, a flue outlet damper gasket and mounting hardware bag (12 pcs each 5/16 -18 x 7.8" hex head plated cap screws and 1/4" USS plated washers).

2. Assemble two cap screw/washer combinations, then, insert cap screws/washers through a flue outlet damper assembly-mounting ring at 3 o'clock and 9 o'clock positions. Place the flue outlet damper gasket onto cap screws and position damper with gasket onto boiler rear flue collector, aligning screws with flue collector threaded holes.
3. Thread the screws at 3 o'clock and 9 o'clock positions into flue collector threaded holes hand tight.
4. Assemble remaining cap screw/washer combinations, then, insert cap screws/washers through a flue outlet damper assembly-mounting ring/gasket and thread the screws into flue collector threaded holes hand tight.
5. Alternately tighten the screws with an open end or socket head wrench to complete the assembly.

Boiler Model	Flue Outlet Damper Carton Part Number	Flue Outlet Damper Diameter	Recommended Vent Connection Size
MPC4 & MPC5	102473-01	7" Dia.	7" Dia.
MPC6 thru MPC8	102473-02	8" Dia.	8" Dia.
MPC9 thru MPC12	102473-03	10" Dia.	10" Dia.
MPC13 thru MPC18	102473-04	12" Dia.	12" Dia.

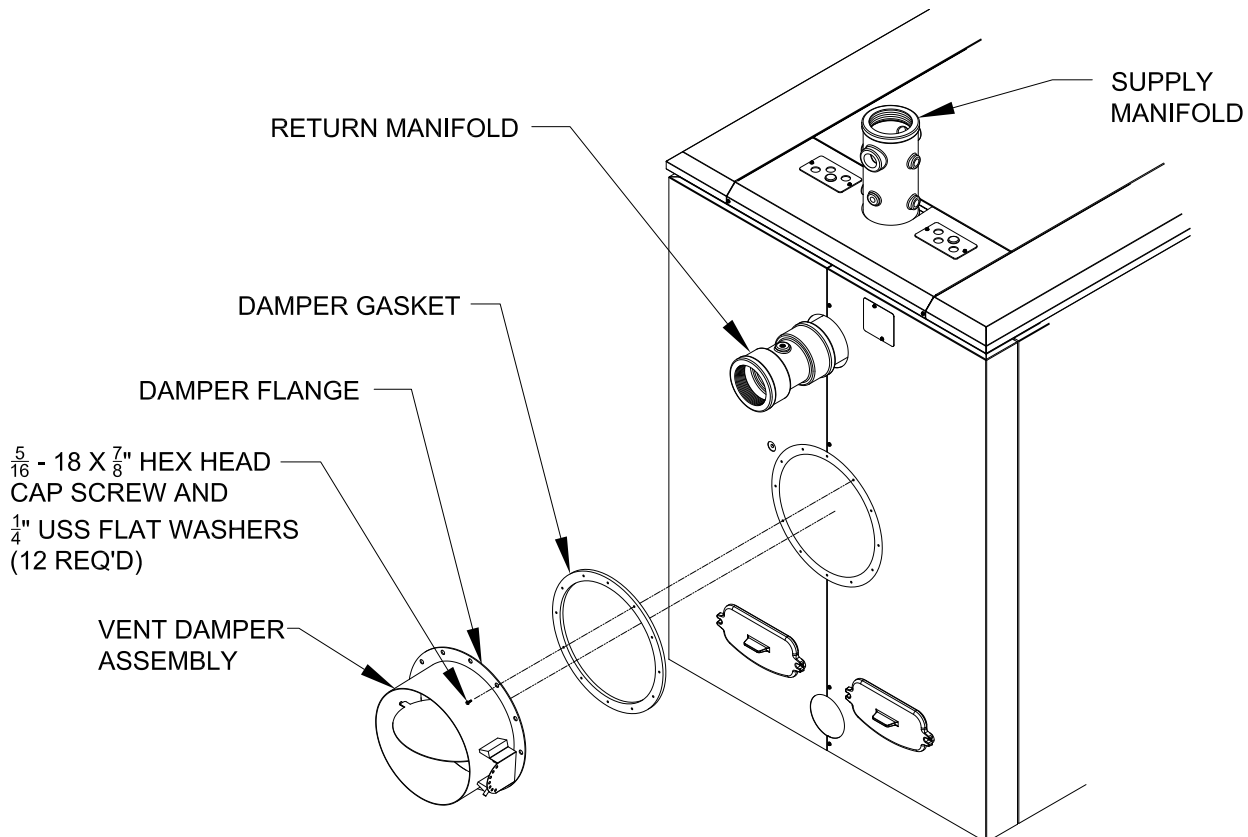


Figure 46: Install Flue Outlet Damper Assembly

U. Install Optional Split Jacket Panels for Burner Swing Door (BSD) Cover (if applicable).

1. Open carton and remove contents.
2. Locate hanger bracket for BSD cover, secure to jacket front panel with three (3) #8 x 1/2" hex head SMS as shown in Figure 47.
3. Install left side BSD cover panel with offset bend as shown in Figure 47. Engage hooks on outer edge of panel through slotted openings on jacket front panel installed on boiler. At the same time, engage top flange of left cover panel behind hanger bracket, see Figure 47, Detail 'A'. Pull down on left cover panel to lock hooks in slots and top flange behind hanger bracket.

4. Install right side BSD cover panel using the same procedure used on left cover panel. Before locking panel in place, make sure right cover panel overlaps offset flange of left cover panel.
5. Secure panels together at seam using six (6) #8 x 1/2" lg. hex head SMS, one (1) screw on top and five (5) screws on the face as shown in Figure 47.
6. Locate Logo Plate shipped in Instruction Envelope. Peel paper off adhesive strips and install by inserting positioning tabs on rear of Logo Plate into slotted openings in upper left corner of left cover panel as shown in Figure 47.

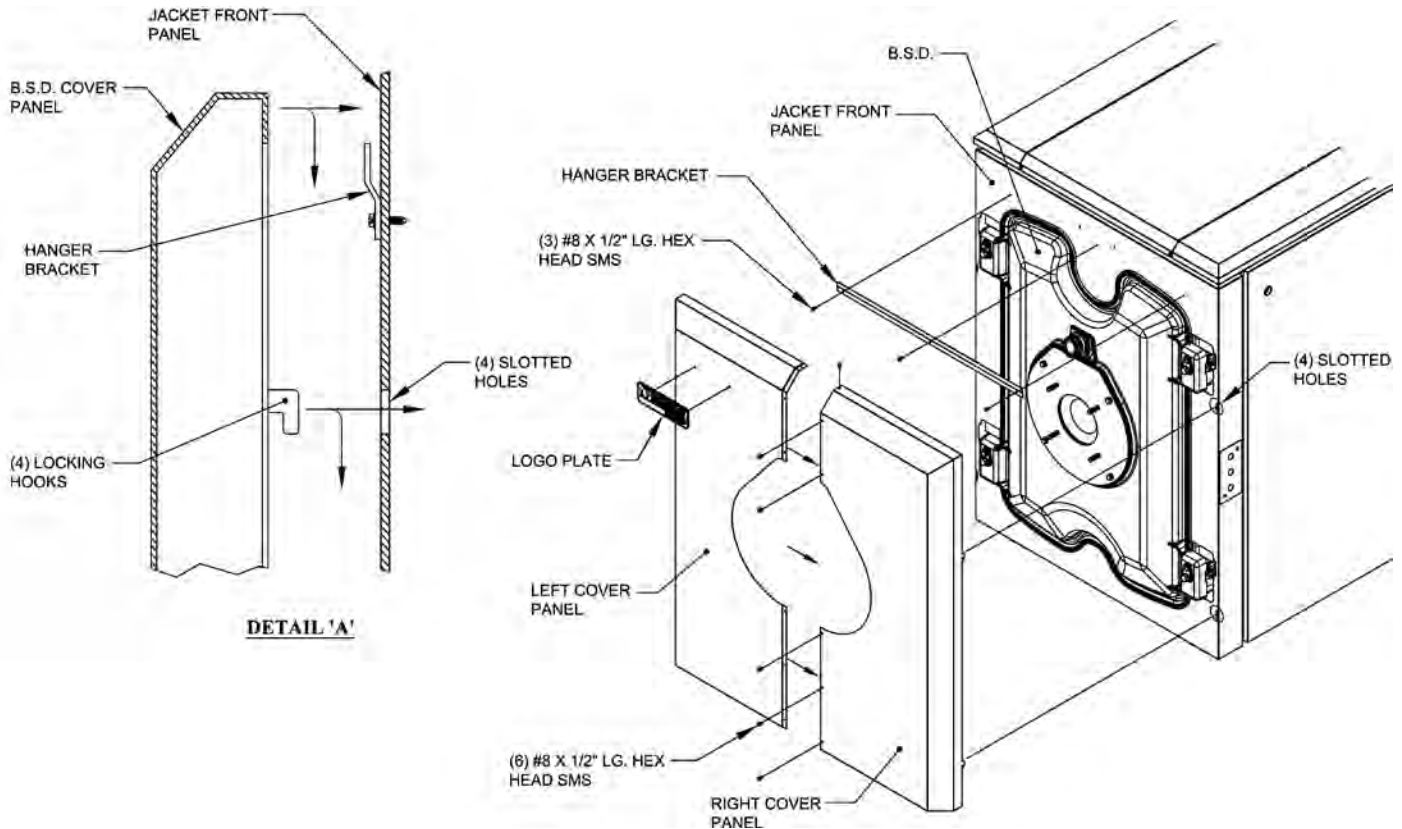


Figure 47: Install Jacket Panels for Optional Burner Swing Door Cover

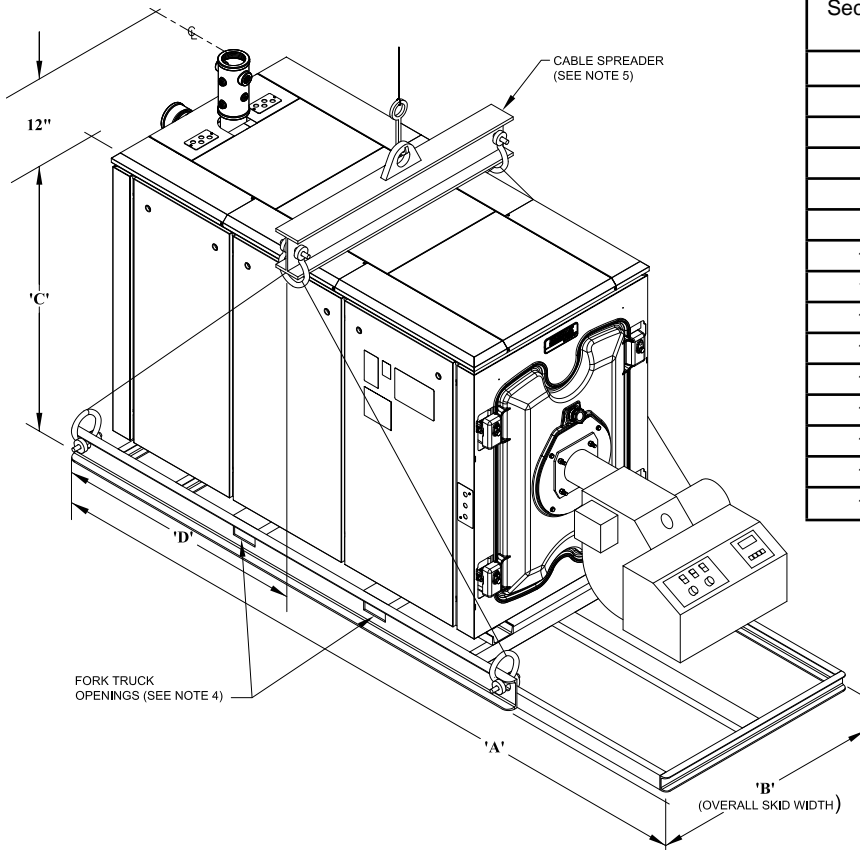
SECTION IV - INSTALLATION INSTRUCTIONS

A. PACKAGED BOILER

1. The packaged boiler comes on its own shipping skid (see Figure 48) and the assembled block is hydrostatically tested at the factory. Once the boiler is in its final position, **PERFORM ANOTHER HYDROSTATIC TEST AT 1½ TIMES THE WORKING PRESSURE OF THE BOILER** (see Section II, Paragraph C). The shipping skid can be used as a housekeeping pad unless local codes say otherwise. Most controls are pre-wired down to the burner. If burner is equipped with a lead lag panel, lead lag controls will be shipped loose for header mounting. The power can be supplied to the burner if equipped with a control panel. If burner has no panel, the power must be supplied to a junction box near the front of the boiler.
2. If the boiler burner unit was factory fire tested, the burner was adjusted to approximately 10.2% CO₂ (gas) or 13.2% CO₂ (oil) with an overfire pressure as listed in Table II of this manual. Final adjustments should be made once the unit is installed.

B. BOILER PIPING - HEATING APPLICATIONS

CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM (see Figures 49a, 49b, 50a and 50b).



WARNING

Failure to properly pipe boiler may result in improper, unsafe system operation and void manufacturer's warranty.

DO NOT improperly pipe boiler.

WARNING

All hot water pipes must have clearances of at least 1/2" from all combustible construction.

WARNING

A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.

1. **HOT WATER HEATING** - This boiler must be installed in strict accordance to the instructions found in this installation manual. Deviations from these installation instructions may void manufacturer's warranty.

Packaged Boiler Shipping Information

Number of Sections	Length A (Inch)	Width B * (Inch)	Height C (Inch)	Approx. Center of Gravity D ** (Inch)	Approx. Shipping Weight (Lbs.)
4	77½	48	61½	23¼	2789
5	83½	48	61½	26¼	3272
6	95½	48	61½	29¼	3755
7	101¼	48	61½	32½	4249
8	108	48	61½	35½	4783
9	114	48	61½	38½	5261
10	130¼	48	61½	44½	5757
11	136½	48	61½	47¼	6236
12	142½	48	61½	50¼	6739
13	148½	48½	61½	53¼	7227
14	154¼	48½	63½	57	7760
15	161	48½	63½	60	8335
16	167	48½	63½	63	8824
17	173	48½	63½	66	9324
18	179¼	48½	63½	69¼	9823

* Width can vary with gas train configuration.

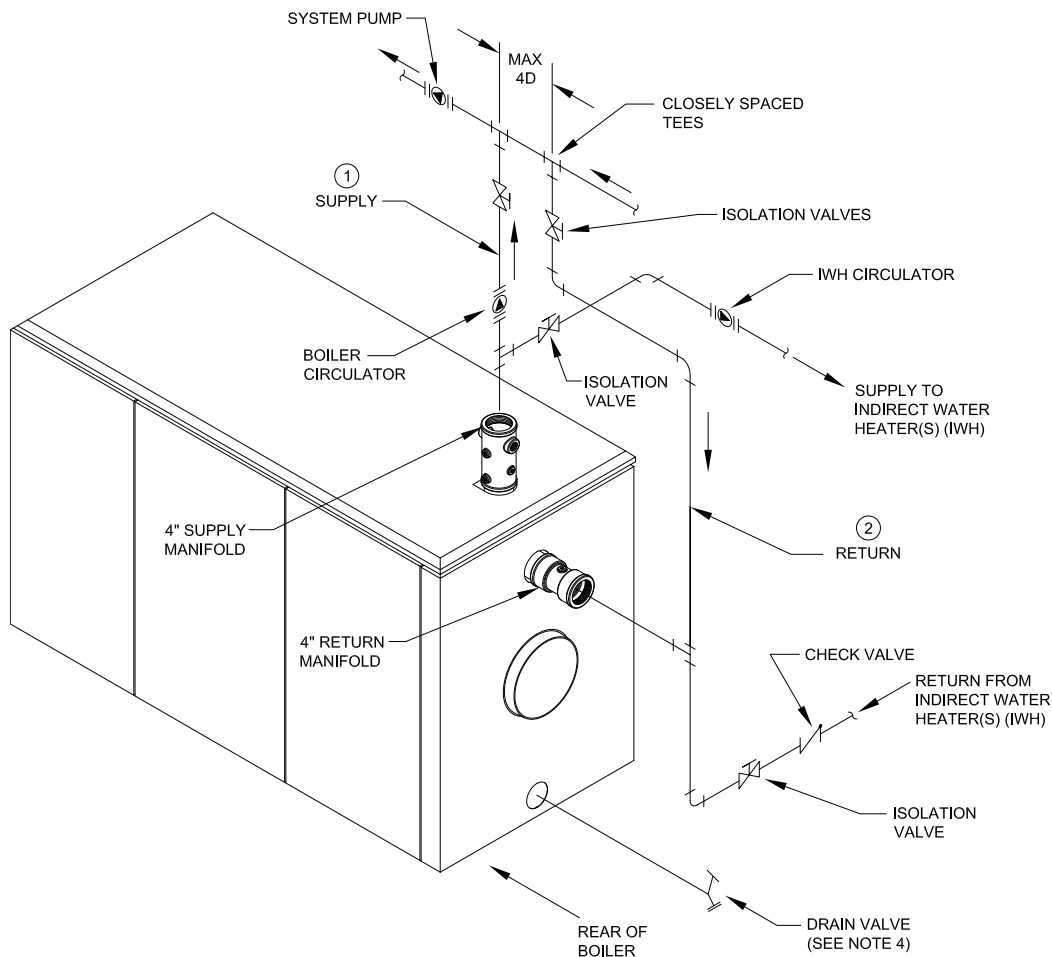
** Varies slightly with burner and gas train configuration.

1. Do not tilt. Exercise caution when lifting to avoid damage.
2. This boiler can be lifted by fork truck. Do not truck from front.
3. When lifting from rear, forks must extend from beyond center of gravity and second skid cross bar.
4. When lifting from side, forks must extend to opposite skid rail and straddle center of gravity.
5. Cablespreader is to prevent jacket damage. Spreader width should equal B (width of skid) + 12". Adjust cable lengths to lift at approximate center of gravity per chart.

Figure 48: Packaged Boiler Shipping Information

Boiler Operating Requirements:

- Minimum Return Water Temperature = 80°F
- Maximum Delta T = 80°F
- Minimum Supply Water Temperature = 130°F

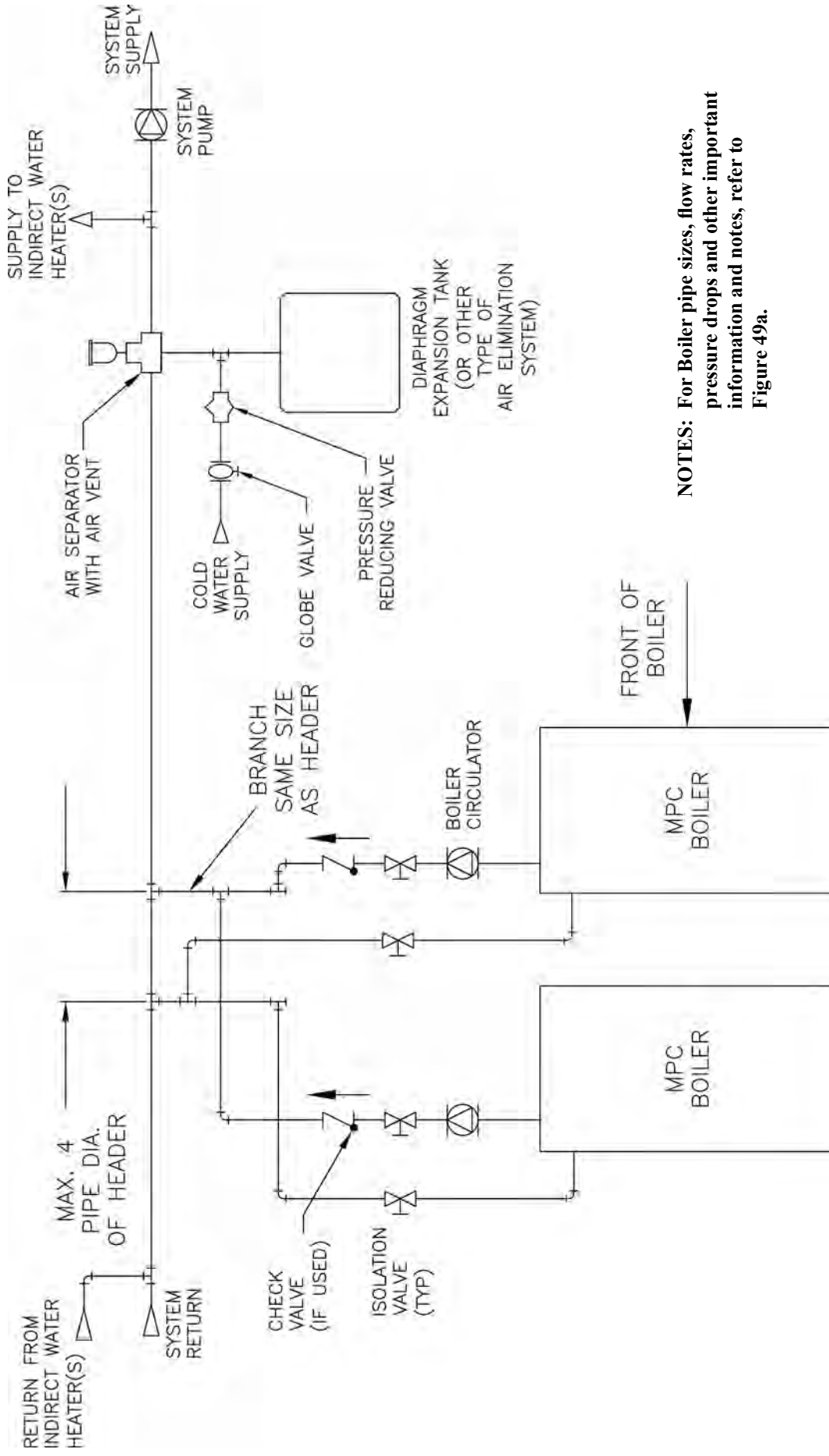


Boiler Model	① Supply / ② Return					
	20°F Rise			40°F Rise		
	Nom. I.D. (Inch)	Water Side Press. Drop (Ft/Wtr)	Flow Rate (GPM)	Nom. I.D. (Inch)	Water Side Press. Drop (Ft/Wtr)	Flow Rate (GPM)
MPC4	2	1.9	42.4	1½	0.9	21.2
MPC5	2	2.6	65.2	1½	1.6	32.6
MPC6	2	3.3	83.7	1½	2.3	41.9
MPC7	2½	4.0	102.3	1½	3.0	51.2
MPC8	2½	4.7	120.9	2	3.7	60.5
MPC9	3	5.4	139.6	2	4.4	69.8
MPC10	3	6.1	158.1	2	5.1	79.0
MPC11	3	6.8	176.7	2	5.8	88.3
MPC12	3	7.5	195.2	2½	6.4	97.6
MPC13	4	8.2	213.8	2½	7.1	106.9
MPC14	4	8.9	232.3	2½	7.8	116.1
MPC15	4	9.6	250.9	2½	8.5	125.5
MPC16	4	10.3	269.5	3	9.2	134.8
MPC17	4	11.0	288.1	3	9.9	144.1
MPC18	4	11.7	306.6	3	10.6	153.3

NOTES:

1. All piping is schedule 40.
2. Pipe sizes listed are based on a 20°F or 40°F Delta T (temperature rise across the boiler). Select one to match application.
3. When specified supply/return piping size is less than 4", install appropriate size reducer directly onto boiler supply and return manifolds.
4. Drain valve - ball valve preferable, gate valve acceptable alternative (supplied by others). Minimum valve size per ASME Code is 3/4" NPT.
5. Swing joints may be piped over the top of the boiler if space is limited.
6. System design must accommodate the above Boiler Operating Requirements.
7. Diaphragm expansion tank shown, but other types of air elimination systems may be used.

Figure 49a: Recommended MPC Minimum Piping - Single Boiler Application



NOTES: For Boiler pipe sizes, flow rates, pressure drops and other important information and notes, refer to Figure 49a.

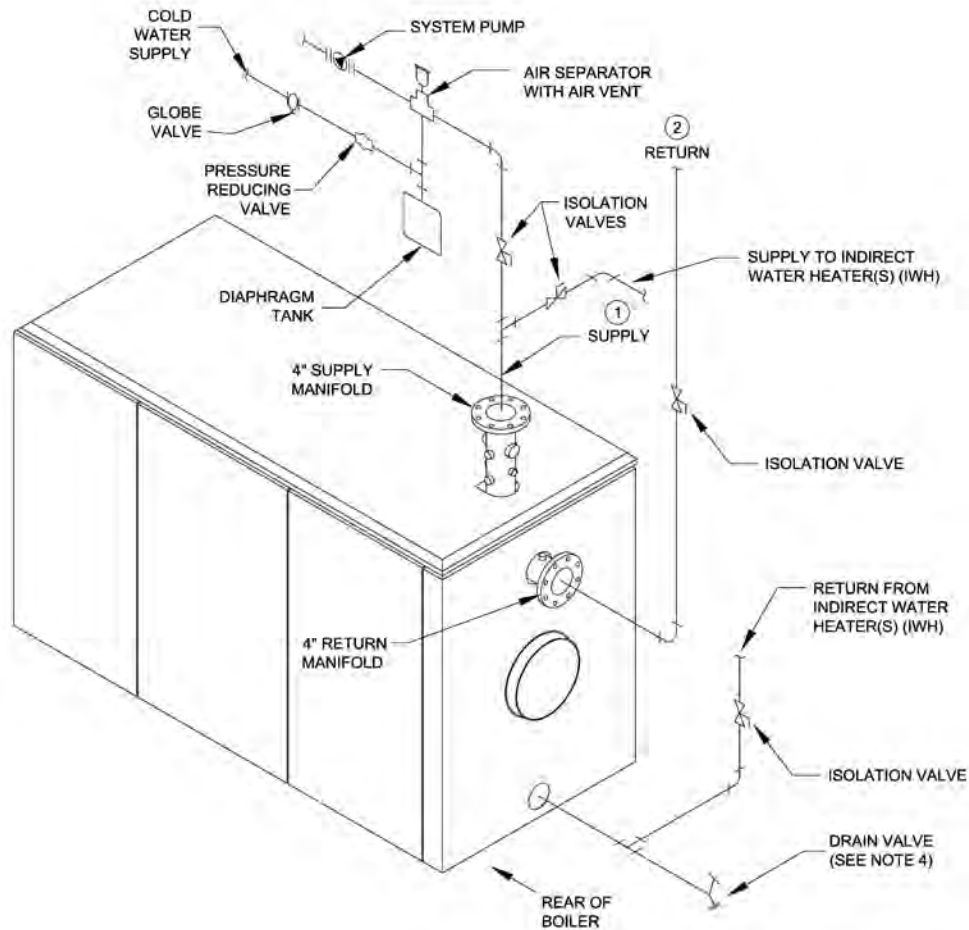
Boiler Operating Requirements:

- Minimum Return Water Temperature = 80°F
- Maximum Delta T = 80°F
- Minimum Supply Water Temperature = 130°F

Figure 49b: Recommended MPC Minimum Piping - Multiple Boiler Application

Boiler Operating Requirements:

- Minimum Return Water Temperature = 80°F
- Maximum Delta T = 80°F
- Minimum Supply Water Temperature = 130°F

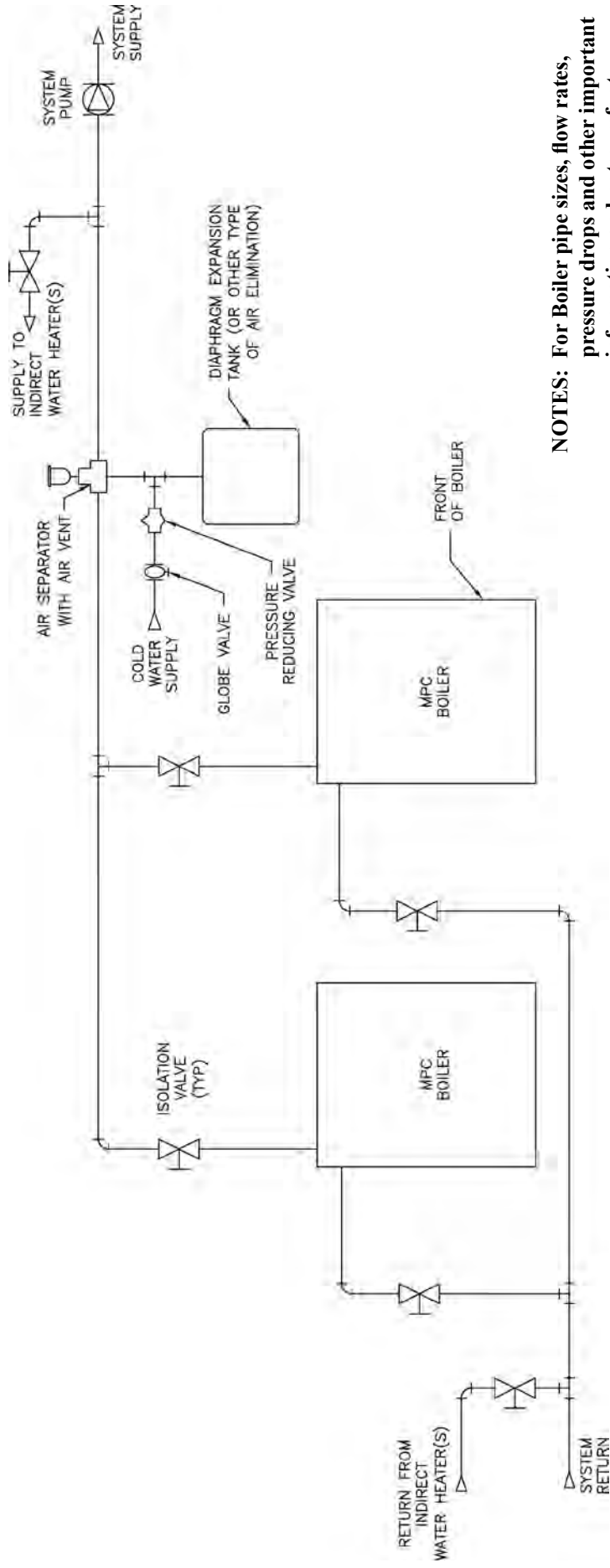


Boiler Model	① Supply / ② Return					
	20°F Rise			40°F Rise		
	Nom. I.D. (Inch)	Water Side Press. Drop (Ft/Wtr)	Flow Rate (GPM)	Nom. I.D. (Inch)	Water Side Press. Drop (Ft/Wtr)	Flow Rate (GPM)
MPC4	2	1.9	42.4	1½	0.9	21.2
MPC5	2	2.6	65.2	1½	1.6	32.6
MPC6	2	3.3	83.7	1½	2.3	41.9
MPC7	2½	4.0	102.3	1½	3.0	51.2
MPC8	2½	4.7	120.9	2	3.7	60.5
MPC9	3	5.4	139.6	2	4.4	69.8
MPC10	3	6.1	158.1	2	5.1	79.0
MPC11	3	6.8	176.7	2	5.8	88.3
MPC12	3	7.5	195.2	2½	6.4	97.6
MPC13	4	8.2	213.8	2½	7.1	106.9
MPC14	4	8.9	232.3	2½	7.8	116.1
MPC15	4	9.6	250.9	2½	8.5	125.5
MPC16	4	10.3	269.5	3	9.2	134.8
MPC17	4	11.0	288.1	3	9.9	144.1
MPC18	4	11.7	306.6	3	10.6	153.3

NOTES:

1. All piping is schedule 40.
2. Pipe sizes listed are based on a 20° F or 40° F Delta T (temperature rise across the boiler). Select one to match application.
3. When specified piping size is less than 4", install appropriate size reducer directly onto boiler supply and return manifolds.
4. Drain valve - ball valve preferable, gate valve acceptable alternative (supplied by others). Minimum valve size per ASME code is 3/4" NPT.
5. Swing joints may be piped over the top of the boiler if space is limited.
6. System design must accommodate the above Boiler Operating Requirements.
7. Diaphragm expansion tank shown, but other types of air elimination systems may be used.

Figure 50a: Alternate MPC Minimum Piping - Single Boiler Application



NOTES: For Boiler pipe sizes, flow rates, pressure drops and other important information and notes, refer to Figure 50a.

Boiler Operating Requirements:

- Minimum Return Water Temperature = 80°F
- Maximum Delta T = 80°F
- Minimum Supply Water Temperature = 130°F

Figure 50b: Alternate MPC Minimum Piping - Multiple Boiler Application

- a. Temperature and Flow Requirements – An existing parallel piping system may be used, provided the return water is not below 80°F and the return water temperature is not more than 80°F less than the boiler outlet temperature. A flow analysis should be performed to determine the flow through the boiler when the minimum (and smallest) and maximum number of zones are activated.

Sufficient flow through the boiler must be maintained. The recommended maximum temperature difference between the boiler supply and return water is 40°F. However, a maximum delta T of 80°F across the boiler is allowable. A minimum boiler supply water temperature of 130°F must be maintained to avoid sustained condensing within the combustion chamber.

- b. Primary/Secondary Piping - If the conditions above cannot be met, then parallel piping systems must be converted to an arrangement that will provide the proper water flow through the boiler at the proper temperatures. Primary/Secondary piping is a common method for isolating the boiler from the system. The concept must be for the boiler loop to inject heat into a primary loop, provided the return water into the boiler is at least 80°F. A by-pass containing two closely spaced tees must be installed to de-couple the boiler loop from the primary loop (see Figure 51). The converted system should resemble Figure 52. Care must be taken to avoid dead heading the system pump. Conversions should be reviewed and approved by a Consulting Engineer or other qualified professional to avoid system deficiencies.

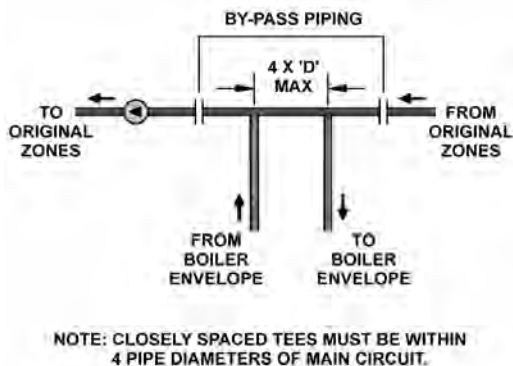


Figure 51: Parallel Piping Conversion

Multiple boilers are installed the same as single boiler installations. Each boiler loop will contain its own boiler circulator (see Figure 49b). The boiler circulator selection will maintain a constant and minimum flow through the boiler during every heat demand. The circulator must be properly selected, based on the design temperature between the boiler supply and boiler return. A boiler circulator must be used with a primary/secondary piping arrangement.

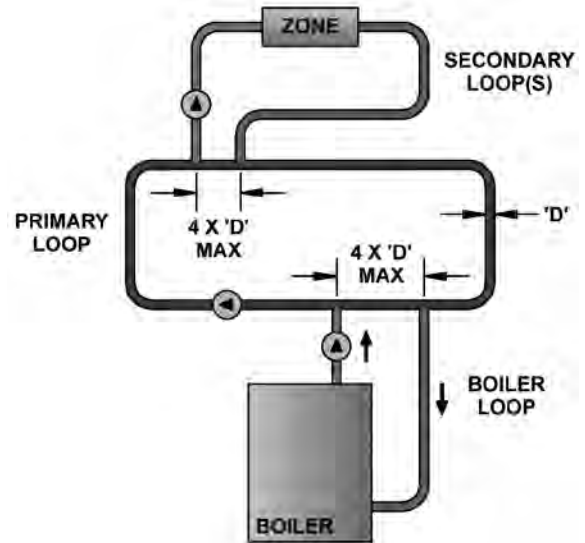


Figure 52: Typical Burnham Boiler - Primary - Secondary Loop System

- c. Alternate Piping Arrangements - Piping arrangements other than Parallel and Primary/Secondary, such as System Bypass, are acceptable as long as they ensure that the flow and temperature requirements of the boiler are met.
- d. Glycol Antifreeze Solutions - Many systems today use ethylene or propylene glycol antifreeze solutions as a measure for freeze protection, as well as a pump lubricator and corrosion inhibitor. The properties of the glycol mixture have an impact on valve and pump sizing. All glycol solutions have a lower specific heat than water. This means that the glycol solution cannot transfer heat as well as pure water, resulting in the need for higher flow rates. In addition, the viscosity of the glycol solution is usually higher than water, requiring a higher pump head for the same given flow. Consult factory for specific applications, pump selection and flow rate.
- e. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves to prevent the chilled medium from entering the boiler. See Figure 53.

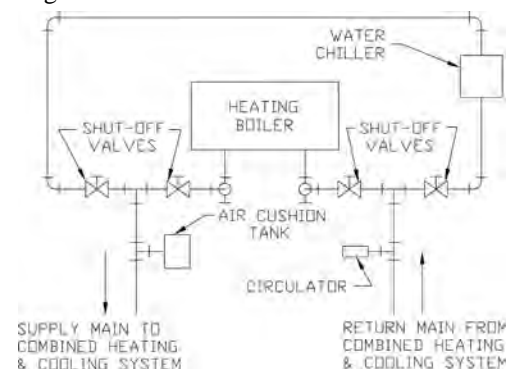


Figure 53: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems

NOTICE

When possible, domestic hot water production should utilize dedicated boiler(s). This will allow the other boiler(s) to be shut down and isolated during the summer months. If the boiler load is shared between heating and domestic hot water, then one needs to determine if a hot water priority is required. If a priority is not selected, erratic domestic hot water production may result during the beginning and end of every heating season. Conversely, a priority for domestic hot water production may cause a significant heating zone activation delay, in an improperly balanced system. Parallel piping conversions may require isolation from the heating system to prevent system flow influence on DHW performance. Consult a qualified system heating professional to design for the proper application.

C. BOILER PIPING, DOMESTIC HOT WATER (DHW) APPLICATION

– The MPC boiler can be used in many different piping applications to produce Domestic Hot Water (DHW). In some applications, depending on the control strategy (outdoor reset, setpoint operation, etc.) and size of the boiler, it is recommended to isolate the space heating load from the DHW load. For example, if the domestic load is more than the space heating load, it is beneficial to dedicate one or more boilers solely to DHW production and one or more boilers solely to space heating, since during mild weather conditions, the boiler(s) will have more capacity than is required. Piped in the recommended manner, the space heating boiler(s) can be shut down during the summer months to conserve energy and to avoid short cycling.

The use of indirect water heaters for domestic hot water generation is commonly recommended since they provide DHW storage. A tempering valve and recirculation loop are advantageous in these applications, because they provide both high temperature and tempered domestic water to the

system, eliminating the need to purge and waste water until it reaches the desired temperature. See Figures 49a, 49b, 50a and 50b for recommended indirect water heater piping.

NOTICE

DO NOT use the boiler circulator as an indirect domestic hot water system circulator.

D. RELIEF VALVE DISCHARGE PIPING, see Figure 54. Pipe discharge to within 4" of floor or to a suitable drain. Do not reduce piping size or install shut-off valve in discharge piping.

If discharge is weeping, do not plug relief valve or cap discharge piping, replace valve immediately.

E. INSTALL ELECTRIC WIRING in accordance with National Electric Code and local regulations. A separate ELECTRICAL CIRCUIT should be run from meter with a Fused Disconnect Switch in this Circuit.

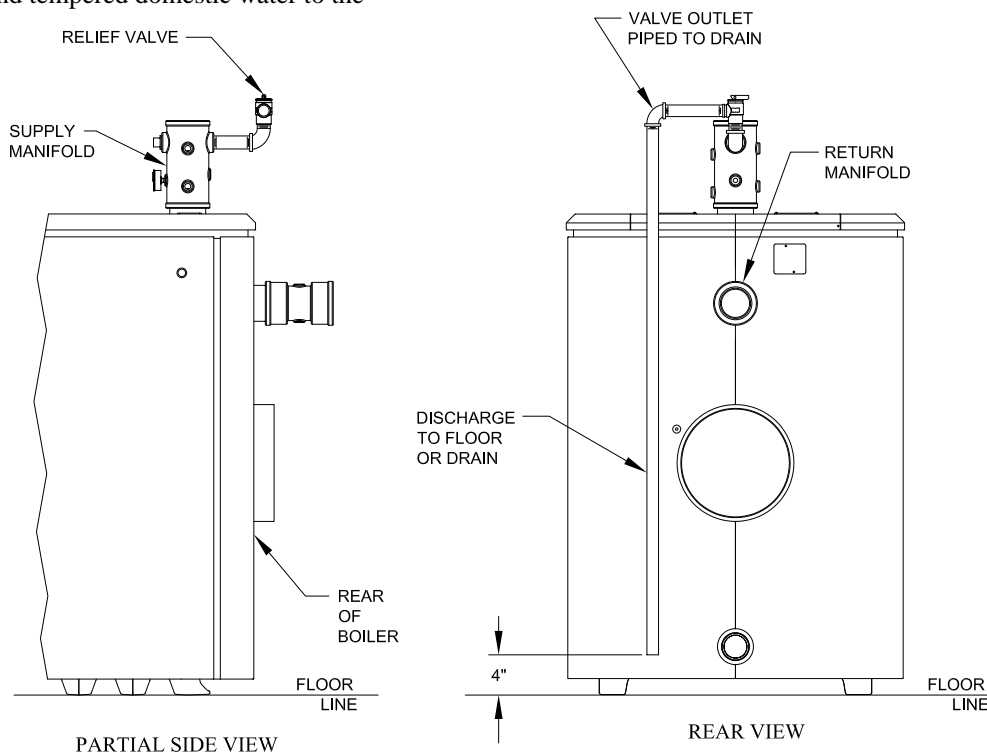


Figure 54: Discharge Piping for Pressure Relief Valve

SECTION V - OPERATING INSTRUCTIONS

WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage or personal injury.

If any unusual or improper operation or site conditions are observed, turn the boiler off and contact an experienced and skilled service agency.

Follow component manufacturer's instructions. Component manufacturer's instructions were provided with the boiler. Contact component manufacturer for replacement if instructions are missing. Do not install, start up, operate, maintain or service this boiler without reading and understanding all of the component instructions. Do not allow the boiler to operate with altered, disconnected or jumpered components. Only use replacement components identical to those originally supplied with the boiler and burner.

A. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.

B. FILL HEATING SYSTEM WITH WATER.

1. **CLEAN HEATING SYSTEM IF boiler water is dirty.** Refer to step (F) for proper cleaning instructions for water boilers.

Fill entire Heating System with water and vent air from system. Use the following procedure on a Series Loop or Multi-zoned System to remove air from system when filling:

- a. Close isolation valve in boiler supply piping.
- b. Isolate all circuits by closing zone valves or balancing valves.
- c. Attach a hose to hose bib located just below isolation valve in boiler supply piping.
(Note - Terminate hose in five gallon bucket at a suitable floor drain or outdoor area).
- d. Starting with one circuit, open zone valve.
- e. Open hose bib.
- f. Open fill valve (Make-up water line should be located directly above isolation valve in boiler supply piping).
- g. Allow water to overflow from bucket until discharge from hose is bubble free for 30 seconds.
- h. Open zone valve to the second zone to be purged, then close the first. Repeat this step until all zones have been purged, but always have one zone open. At completion, open all zone valves.

- i. Close hose bib, continue filling the system until the pressure gauge registers normal system design operating pressure. Close fill valve.
(Note - If make-up water line is equipped with pressure reducing valve, system will automatically fill to normal system design operating pressure. Leave globe valve open).
- j. Open isolation valve in boiler supply piping.
- k. Remove hose from hose bib.

DANGER

Do not operate boiler with pressure above maximum allowable working pressure listed on the Boiler's ASME Data Label.

DO NOT draw water from boiler while in use. When adding water while boiler is in operation, do not open supply valve fully but add water slowly.

C. SET CONTROLS with burner service switch turned "OFF".

1. **PRESS RESET BUTTON** on primary control and release.
2. **BOILER OPERATING AQUASTAT** - The operating aquastat, L4006A should be set to the designed supply temperature, typically 180°F.
3. **BOILER HIGH LIMIT AQUASTAT** - The high limit aquastat, L4006E, can be identified with a red manual reset button. Ideally, the high limit aquastat should be set high enough above the operating aquastat setting so as to avoid nuisance shutdowns on manual reset. The temperature must be set below the maximum permissible temperature for any system related component affected by boiler supply water. Under no circumstances can the high limit aquastat be set higher than 250°F.

D. ADJUST BURNER according to the Burner Manual.

The MPC boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control is tripped, the burner has experienced ignition failure. Before pressing the reset button, call your serviceman immediately.

WARNING

Do not attempt to start the burner when excess oil or gas has accumulated in the combustion chamber, when the unit is full of vapor, or when the combustion chamber is very hot.

E. TEST CONTROLS

WARNING

Before installation of the boiler is considered complete, the operation of the boiler controls should be checked, particularly the low water cutoff and the high limit control.

1. CHECK OPERATING CONTROL OPERATION.
Raise and lower operating control setting as required to start and stop burner.

2. CHECK OPERATION OF HIGH LIMIT CONTROL.

Jumper operating control terminals. Allow burner to operate until shutdown by limit. Installation is not considered complete until this check has been made.

REMOVE JUMPER.

3. CHECK LOW WATER CUTOFF CONTROL
Raise operating control setting to allow burner to operate. Close isolation valves in supply and return near boiler piping. Open boiler drain to allow water level to drop until burner operation is shut down by low water cutoff. If necessary, open relief valve for air to facilitate draining.

Close boiler drain and refill boiler. Burner should automatically restart during fill, unless low water cutoff control requires manual reset. Close relief valve when water flows out discharge piping.

OPEN SUPPLY AND RETURN ISOLATION VALVES.

RESET OPERATING CONTROL.

CAUTION

Probe and float type low water cutoff devices require annual inspection and maintenance.

Refer to Section VI step (C) for proper cleaning instructions.

F. BOILER AND SYSTEM CLEANING (water side)

NOTICE

A qualified water treatment chemical specialist should be consulted for recommendations regarding appropriate chemical compounds and concentrations which are compatible with local environmental regulations.

WARNING

Chemicals used in treating boiler water are toxic and/or harmful. Always use protective clothing and equipment when working with/ near chemicals. Contact local authorities to determine if treated boiler water can be discharged into local waste water system.

1. Filling of Boiler and System --- General --- In a hot water heating system, the boiler and entire system (other than the expansion tank) must be full of water for satisfactory operation. Water should be added to the system until the boiler pressure gauge registers normal system design operating pressure. To insure that the system is full, water should come out of all air vents when opened.
2. Boiling Out of Boiler and System. The oil and grease which accumulate in a new hot water boiler can be washed out in the following manner.
 - a. Remove safety relief valve using extreme care to avoid damaging it.
 - b. Add an appropriate amount of recommended boilout compound.
 - c. Reinstall safety relief valve.
 - d. Fill the entire system with water.
 - e. Start firing the boiler.
 - f. Circulate the water through the entire system.
 - g. Vent the system, including the radiation.
 - h. Allow boiler water to reach operating temperature, if possible.
 - i. Continue to circulate the water for a few hours.
 - j. Stop firing the boiler.
 - k. Drain the system in a manner and to a location that hot water can be discharged with safety.
 - l. Remove plugs from all available returns and wash the water side of the boiler as thoroughly as possible, using a high-pressure water stream.
 - m. Refill the system with fresh water.
3. Add appropriate boiler water treatment compounds as recommended by your local qualified water treatment company.
4. Make pH or Alkalinity Test.

After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydriion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydriion dispenser gives the reading in pH. Hydriion paper is inexpensive and obtainable from any chemical supply house or through your local druggist.

The pH should be higher than 7 but lower than 11. Add some appropriate water treatment chemicals, if necessary, to bring the pH within the specified range. With this lower level of protection, care must be exercised to eliminate all of the free oxygen in the system.

5. Boiler is now ready to be put into service.

G. FREQUENT WATER ADDITION

IMPORTANT

IF, DURING NORMAL OPERATION, IT IS NECESSARY TO ADD WATER MORE FREQUENTLY THAN ONCE A MONTH, CONSULT A QUALIFIED SERVICE TECHNICIAN TO CHECK YOUR SYSTEM FOR LEAKS.

A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the cast iron through from the waterside. Since neither of these failure types are the result of a casting defect the warranty does not apply. Clearly it is in everyone's best interest to prevent this type of failure. The maintenance of system integrity is the best method to achieve less makeup water.

H. OXYGEN CORROSION:

WARNING

Oxygen contamination of the boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. Burnham's standard warranty does not cover problems caused by oxygen contamination of boiler water or scale (lime) build-up caused by frequent addition of water.

There are many possible causes of oxygen contamination such as:

- a. Addition of excessive make-up water as a result of system leaks.
- b. Absorption through open tanks and fittings.
- c. Oxygen permeable materials in the distribution system.
- d. Suction at pump and valve seals.

In order to ensure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:

- a. Repairing system leaks to eliminate the need for addition of make-up water.
- b. Eliminating open tanks from the system.
- c. Eliminating and/or repairing fittings which allow oxygen absorption.
- d. Use of non-permeable materials in the distribution system.
- e. Isolating the boiler from the system water by installing a heat exchanger.

SECTION VI - SERVICE INSTRUCTIONS

DANGER

This boiler used flammable gas, high voltage electricity, moving parts, and very hot water under high pressure. Assure that all fuel and electric power supplies are off and that the water temperature is cool before attempting any disassembly or service.

More than one gas shut-off valve and electrical disconnect switch are used on the boiler. Assure that all gas valves and electrical disconnect switches are off before attempting any disassembly or service.

Do not attempt any service work if gas is present in the air in the vicinity of the boiler. Never modify, remove or tamper with any control device.

WARNING

This boiler must only be serviced and repaired by skilled and experienced service technicians.

If any controls are replaced, they must be replaced with identical models.

Read, understand and follow all the instructions and warnings contained in all the sections of this manual.

If any electrical wires are disconnected during service, clearly label the wires and assure that the wires are reconnected properly.

NEVER operate boiler without all sight glasses and brackets in place and securely fastened and sealed. Very HOT combustion gas may cause burn injury.

Read, understand and follow all the instructions and warnings contained in ALL of the component instruction manuals.

Assure that all safety and operating controls and components are operating properly before placing the boiler back in service.

IMPORTANT - See Section V, Item (G) under Operating Instructions, if it becomes necessary to add water to the boiler more frequently than once a month.

- A. GENERAL** - Inspection should be conducted annually. Service as frequently as specified in following paragraphs. Refer to Table XII for recommended periodic testing of safety controls and other equipment. While service or maintenance is being done, electrical power to the boiler must be "off".

B. CLEAN THE BOILER HEATING SURFACES AND FLUE at least once each year, preferably at the end of the heating season.

1. **CLEAN THE VENT SYSTEM** - Vent system should be checked annually for:
 - a. Obstructions.
 - b. Accumulations of soot.
 - c. Deterioration of vent pipe or vent accessories due to condensation or other reasons.
 - d. Proper support - no sags, particularly in horizontal runs.
 - e. Tightness of joints.

Remove all accumulations of soot with wire brush and vacuum. Remove all obstructions. Replace all deteriorated parts and support properly. Seal all joints.

2. **CLEAN THE BOILER FLUEWAYS AND COMBUSTION CHAMBER.**

- a. Disconnect the fuel line(s) and remove the burner. The burner may remain attached to the BSD during cleaning if:
 - i. enough space exists for the BSD to swing open completely with the burner still attached
 - ii. and the burner weight is supported by a suitable prop at all times.
- b. Remove optional BSD cover panels (if provided).
- c. Remove four (4) 9/16" cap screws and lock washers from the hinge pockets on the BSD.
- d. Open the BSD and remove the baffles from all flue passages.
- e. Use a wire or fiber bristle brush to remove any accumulated soot or debris from all of the flue baffles.

- f. Use a wire or fiber bristle brush of appropriate length and diameter to allow sufficient cleaning of all flue passages. Using long strokes, push the brush the whole way through the boiler and then pull it out. Repeat this process until all surfaces of each of the flue passages have been cleared of all soot and debris.
- g. Vacuum all loose debris that has collected in the rear of the combustion chamber and in the turnaround passages into the second flue passes.
- h. Use a wire or fiber bristle brush to clean all of the surfaces of the combustion chamber and turnaround passages to the second flue passes.
- i. Vacuum all loose debris in the bottom of the combustion chamber and in the turnaround passages to the second flue passes.
- j. Remove the flue collector clean-out covers at the rear of the boiler by removing four (4) 5/16" cap screws and washers. Through these clean-out openings, vacuum all loose debris from the bottom of the flue collector.

3. REASSEMBLE BOILER.

- a. Reattach the flue collector clean-out covers to the rear of the boiler, verifying that the silicone-coated rope gaskets are still in satisfactory condition. Replace the rope gaskets, if necessary, before reassembly. Tighten the covers snugly into place using original 5/16" hardware. Do not over tighten.
- b. Insert the flue baffles into the appropriate flue passes.
- c. Inspect the insulation and silicone-coated rope gasket on the inside of the BSD, making sure that everything is in place and undamaged. If the BSD insulation or rope gasket is damaged, replace them.
- d. Carefully close the BSD and secure it in place using the original 9/16" hardware. When tightening the bolts, make sure that the BSD is drawn in equally at all four corners. Use an alternating tightening method from corner to corner to pull the door tight equally around the perimeter.

NOTICE

Do not overtighten. The rope gasket will provide sufficient seal when the door is snugged in place.

- e. Reinstall the burner to the BSD (if removed) and secure it in place on its support pedestal. Inspect the burner gasket to assure an adequate seal. Replace it if damaged.
- f. Connect the fuel lines.
- g. Reattach the BSD cover panels (if provided).

CAUTION

Do not start the burner unless BSD, smokepipe, flue clean-out covers and burner are all secured in place.

C. MAINTENANCE OF LOW WATER CUTOFF DEVICES

NOTICE

Probe and float type low water cutoff devices require annual inspection and maintenance.

1. PROBE TYPE LOW WATER CUTOFF

Although these devices are solid state in their operation, the probe is exposed to possible contamination in the boiler water and subject to fouling. It is important to physically remove the probe from the boiler tapping annually and inspect that probe for accumulation of scale or sediment.

Follow these steps to inspect, clean and /or replace the probe:

- a. Turn off electric service to the boiler.
- b. Close isolation valves in supply and return near boiler piping.
- c. Drain boiler water to a level below the tapping for the probe.
- d. Disconnect wiring connections between the low water cutoff control and the probe.

DANGER

Assure that the boiler is at zero pressure before removing the LWCO probe. Do not rely on the pressure gauge to indicate that the boiler is at zero pressure. Open the relief valve to relieve all internal pressure prior to proceeding. Relief valve discharge piping must be piped such that the potential for burns is eliminated.

- e. Dismount the low water cutoff control from the probe.
- f. Unscrew the probe from the boiler tapping.
- g. Inspect that portion of the probe that is exposed to the boiler water for a scale or sediment buildup.
- h. Light deposits may be removed by wiping the probe with a damp cloth. Wiping the probe with a cloth soaked in vinegar will remove more tenacious lime deposits. The most stubborn deposits may be removed from the probe by using a diluted amount (3 part of water to 1 part) of phosphoric acid (H_2PO_4).

WARNING

Exercise caution when handling phosphoric acid and follow the instructions on container label. Always use protective clothing and equipment when working with/near chemicals.

- i. Wire brushing of the probe is not recommended as the soft platinum guard ring sandwiched between the ceramic insulators may be damaged. Care must be taken not to damage this ring in any way or the useful life of the probe may be shortened.
- j. Clean the pipe threads of the probe to remove old, hardened pipe dope and other foreign matter.
- k. Apply a moderate amount of good quality pipe dope to the pipe threads on the probe, leaving the two end threads bare. Do not use PTFE (Teflon) tape.
- l. Screw the probe into the boiler tapping.
- m. Mount the low water cutoff control on the probe.
- n. Reconnect the control to probe wiring.
- o. Fill the boiler.
- p. Add boiler water treatment compound as needed.
- q. Restore electric service to the boiler.
- r. Fire burner to bring the water in the boiler to a boil to drive off free oxygen.
- s. **BEFORE RETURNING BOILER TO SERVICE:** Follow the low water cutoff check out procedure, see Section V, Paragraph E, Item 3.

2. FLOAT TYPE LOW WATER CUTOFF

During the heating season, if an external low water cutoff is on the boiler, the blow off valve should be opened once a month (use greater frequency where conditions warrant), to flush out the sediment chamber so the device will be free to function properly.

Low water cutoffs should be dismantled annually by qualified personnel, to the extent necessary to insure freedom from obstructions and proper functioning of the working parts. Inspect connecting lines to boiler for accumulation of mud, scale, etc., and clean as required. Examine all visible wiring for brittle or worn insulation and make sure electrical contacts are clean and that they function properly. Give special attention to solder joints on bellows and float when this type of control is used. Check float for evidence of collapse and check mercury bulb (where applicable) for mercury separation or discoloration. **DO NOT ATTEMPT TO REPAIR MECHANISMS IN THE FIELD.**

Complete replacement mechanisms, including necessary gaskets and installation instructions, are available from the manufacturer.

D. CHECK BURNER AND CONTROLS at least once a year. See Section V, Paragraph E under Operating Instructions for control checks. See Burner Manual and Table XII for recommended burner tests and adjustments.

E. LUBRICATE BOILER COMPONENTS according to manufacturer's instructions. Generally, this involves the burner and circulator. This includes the type of lubricant to use, frequency of lubrication, and points to lubricate.

F. GENERAL MAINTENANCE CONSIDERATIONS

1. Keep radiators and convectors clean.
2. If a hot water radiator is hot at the bottom but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator, hold small cup under air vent (located near top of radiator), open vent until water escapes and then close.
3. If a large volume of water is added to the system, it is advisable to heat the system to a high temperature and vent again. This will make less venting necessary during the winter.
4. Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. Never place valves in piping leading to or from expansion tank.
5. Boiler and system cleaning will help assure trouble free operation. See Section V, Paragraph F, under Operating Instructions for procedure.

G. ATTENTION TO BOILER WHILE NOT IN OPERATION

WARNING

If boiler is not used during winter time, it must be fully drained to prevent freeze damage.

1. Spray inside surfaces with light lubricating or crankcase oil using a gun with an extended stem so as to reach all corners.
2. Always keep the manual fuel supply valve shut off if the burner is shut down for an extended period of time.
3. To recondition the heating system in the fall season after a prolonged shut down, follow the instructions outlined in Section V - Operating Instructions.

Table XII: Recommended Periodic Testing Check List

Item	Frequency	Accomplished by	Remarks
Gauges and Indicators	Daily	Operator	Make visual inspection and record readings in log
Instrument and Equipment Settings	Daily	Operator	Make visual check against recommended specifications
Firing Rate Control	Weekly Semiannually Annually	Operator Service Technician Service Technician	Verify factory settings Verify factory settings Check with combustion test
Flue, Vent, Stack, or Outlet Dampers	Monthly	Operator	Make visual inspection of linkage; Check for proper operation
Igniter	Weekly	Operator	Make visual inspection; Check flame signal strength if meter-fitted (See "Combustion Safety Controls")
Fuel Valves			
Pilot and Main	Weekly	Operator	Open limit switch; Make aural and visual check; Check valve position indicators and fuel meters, if so fitted
Pilot and Main Gas or Main Oil	Annually	Service Technician	Perform leakage tests (Refer to burner instructions)
Combustion Safety Controls			
Flame Failure	Weekly	Operator	Close manual fuel supply for (1) pilot, (2) main fuel cock, and/or valve(s); Check safety shutdown timing; Record in Log
Flame Signal Strength	Weekly	Operator	If flame signal meter installed, read and log; For both pilot and main flames, notify service organization if readings are very high, very low, or fluctuating (Refer to burner instructions)
Pilot Turndown Tests	As required / annually	Service Technician	Required after any adjustments to flame scanner mount or pilot burner; Verify annually (Refer to burner instructions)
Hot Refractory Hold-In	As required / annually	Service Technician	See "Pilot Turndown Tests"
Low Water Cutoff and Alarm	Daily / Weekly Semiannually	Operator Operator	Refer to instructions Perform a slow drain test in accordance with ASME Boiler and Pressure Vessel Code Section VI

(continued)

Table XII: Recommended Periodic Testing Check List (continued)

Item	Frequency	Accomplished by	Remarks
High Limit Safety Control	Annually	Service Technician	Refer to instructions
Operating Control	Annually	Service Technician	Refer to instructions
Low Draft, Fan, Air Pressure, and Damper Position Interlocks	Monthly	Operator	Refer to burner instructions
High and Low Gas Pressure Interlocks	Monthly	Operator	Refer to burner instructions
High and Low Oil Pressure Interlocks	Monthly	Operator	Refer to burner instructions
High and Low Oil Temperature Interlocks	Monthly	Operator	Refer to burner instructions
Fuel Valve Interlock Switch	Annually	Service Technician	Refer to burner instructions
Purge Switch	Annually	Service Technician	Refer to burner instructions
Burner Position Interlock	Annually	Service Technician	Refer to burner instructions
Burner Rotary Cup Interlock	Annually	Service Technician	Refer to burner instructions
Low Fire Start Interlock	Annually	Service Technician	Refer to burner instructions
Automatic Fuel Changeover Control (Dual Fuel)	At least annually	Service Technician	Under supervision of gas utility
Safety Relief Valve	As required	Operator	In accordance with procedure in Section VI, ASME Boiler and Pressure Vessel Code, Recommended Rules for Care and Operation of Heating Boilers
Burner Components Inspection	Semiannually	Service Technician	Refer to burner instructions

SECTION VII - BURNER SPECIFICATIONS

NOTICE

MPC boiler ratings and capacities are based upon the following burners, pump pressures, nozzle sizes and manifold pressures. Refer to instructions furnished with burner for additional information regarding proper installation, fuel piping, wiring details, burner adjustments, service instructions and burner start-up.

Table XIIIa: Beckett #2 Oil Burner Specifications

BOILER MODEL	BURNER MIN. INPUT (GPH)	BURNER MAX. INPUT (GPH)	BURNER MODEL	AIR TUBE COMB.	BURNER SETTINGS			PUMP PRESSURE (PSI)		NOZZLE MAKE	NOZZLE DATA GPH X ANGLE - TYPE
					HEAD	LOW FIRE AIR OR SHUTTER	HIGH FIRE AIR OR BAND	LOW FIRE	HIGH FIRE		
MPC4	1.75	3.55	CF500	CF60KK	3	10	2	N/A	150	Delavan	2.75 X 70 - B
MPC5	3.0	5.5	CF800	CF60KH	3	8.5	0	N/A	150	Delavan	4.50 X 70 - B
MPC6	4.0	7.1	CF1400	CF66KD	4	43	48	150	250	Delavan	4.50 X 60 - B
MPC7	4.0	8.7	CF1400	CF66KE	6	45	51	150	300	Delavan	5.00 X 45 - B
MPC8	7.0	10.2	CF2300	CF66KG	1	37	47	150	300	Delavan	6.00 X 45 - B
MPC9	7.0	11.8	CF2300	CF66KG	7	39	41	150	295	Hago	7.00 X 45 - P
MPC10	7.0	13.4	CF2300	CF66KG	9	43	54	140	280	Delavan	8.00 X 45 - B
MPC11	10.0	15.0	CF2500	CF66KP	2	22	35	275	275	Hago	4.50 X 45 - P
MPC12	10.0	16.6	CF2500	CF66KP	2	23	41	300	300	Hago	5.00 X 45 - P
MPC13	10.0	18.2	CF2500	CF66KP	5	24	38	300	300	Hago	5.50 X 45 - P
MPC14	10.0	19.8	CF2500	CF66KP	6	26	43	275	275	Hago	6.00 X 45 - P
MPC15	10.0	21.5	CF2500	CF66KP	9	25	40	270	270	Hago	6.50 X 45 - P
MPC16	17.0	23.0	CF3500	CF114KR	7	29	42	275	275	Hago	7.00 X 45 - P
MPC17	17.0	24.5	CF3500	CF114KR	8	30	51	275	295	Hago	7.50 X 45 - P
MPC18	17.0	26.0	CF3500	CF114KR	8	29	68	265	265	Hago	8.00 X 45 - P

Table XIIIb: Beckett Gas Burner Specifications

BOILER MODEL	BURNER MIN. INPUT (MBH)	BURNER MAX. INPUT (MBH)	BURNER MODEL	DAMPER SETTINGS				MANIFOLD PRESSURE ("WC)		MINIMUM INLET PRESSURE ("WC)
				LOW FIRE	HIGH FIRE	SHUTTER	BAND	LOW FIRE (START)	HIGH FIRE	
MPC4	300	500	CG10.3	N/A	N/A	6	0	1.0	1.8	2.80
MPC5	300	773	CG10.5	N/A	N/A	10	0	1.6	3.2	4.80
MPC6	350	995	CG15.2	26	45	N/A	N/A	1.15	3.15	4.30
MPC7	350	1216	CG15.3	29	66	N/A	N/A	1.1	3.5	4.60
MPC8	550	1438	CG25.1	16	45	N/A	N/A	1.1	3.6	4.70
MPC9	550	1660	CG25.2	22	53	N/A	N/A	0.8	3.57	4.37
MPC10	550	1881	CG25.3	25	54	N/A	N/A	0.75	3.4	4.15
MPC11	550	2103	CG25.4	27	52	N/A	N/A	0.9	3.6	4.50
MPC12	730	2325	CG50.1	28	72	N/A	N/A	0.9	4.2	5.10
MPC13	730	2547	CG50.2	20	39	N/A	N/A	0.8	3.6	4.40
MPC14	730	2769	CG50.3	22	39	N/A	N/A	0.7	3.4	4.10
MPC15	730	2991	CG50.3	22	44	N/A	N/A	0.65	4.0	4.65
MPC16	730	3213	CG50.3	21	46	N/A	N/A	0.6	4.3	4.90
MPC17	730	3435	CG50.4	24	47	N/A	N/A	0.7	4.0	4.70
MPC18	730	3657	CG50.4	25	72	N/A	N/A	0.7	4.9	5.60

Table XIVa: Power Flame #2 Oil Burner Specifications

BOILER MODEL	BURNER MIN. INPUT (GPH)	BURNER MAX. INPUT (GPH)	BURNER MODEL	DIFFUSER OPENING (IN.)	APPROX. HIGH FIRE DAMPER SETTING - TOP / BOTTOM DAMPER (IN.)	HIGH FIRE PUMP PRESSURE (PSI)	NOZZLE MAKE	NOZZLE DATA GPH X ANGLE - TYPE
MPC4	3.0	3.55	C1-O	3/16	5/16 / Closed	300	Delavan	2.5 X 90 - B
MPC5	3.0	5.5	C1-O	3/8	1 / Closed	300	Delavan	3.5 X 80 - B
MPC6	3.0	7.1	C1-O	1/4	1-3/32 / 1-3/8	270	Delavan	4.5 X 90 - B
MPC7	3.0	8.7	C1-O	1/4	3/4 / 3/4	270	Delavan	6.0 X 90 - B
MPC8	5.5	10.2	C2-OA	1/4	1 / Closed	300	Monarch	6.5 X 80 - PLP
MPC9	5.5	11.8	C2-OA	1/4	13/16 / 11/16	300	Monarch	7.0 X 80 - PLP
MPC10	5.5	13.4	C2-OA	3/16	Both Wide Open	250	Monarch	8.5 X 80 - PLP
MPC11	5.5	15.0	C2-OA	3/8	1-3/8 / 1-1/4	260	Monarch	9.5 X 70 - PLP
MPC12	5.5	16.6	C2-OB	3/8	1-3/4 / 1-3/4	300	Monarch	10.5 X 70 - PLP
MPC13	5.5	18.2	C2-OB	3/8	1-1/2 / 1-1/4	300	Monarch	11.0 X 80 - PLP
MPC14	5.5	19.8	C2-OB	1/2	1-1/4 / 1-1/4	270	Monarch	12.0 X 80 - PLP
MPC15	5.5	21.5	C3-O	1/2	1-7/8 / Closed	280	Hago	14.0 X 80 - BPS
MPC16	7.4	23.0	C3-O	5/16	1-3/4 / 1-3/4	225	Hago	16.0 X 80 - BPS
MPC17	7.4	24.5	C3-O	3/8	2 / 2	280	Hago	15.0 X 80 - BPS
MPC18	7.4	26.0	C3-O	3/8	Both Wide Open	300	Hago	16.0 X 80 - BPS

Table XIVb: Power Flame Gas Burner Specifications

BOILER MODEL	BURNER MIN. INPUT (MBH)	BURNER MAX. INPUT (MBH)	BURNER MODEL	DIFFUSER OPENING (IN.)	APPROX. HIGH FIRE DAMPER SETTING - TOP / BOTTOM DAMPER (IN.)	APPROX. NAT. GAS MANIFOLD PRESS. AT ORIFICE TEE ("WC)	MINIMUM NAT. GAS INLET PRESS. ("WC) **
MPC4	300	500	JR15A-10	N/A	1/2 *	1.2	4.0
MPC5	300	773	JR30A-12	N/A	3/4 *	1.5	4.2
MPC6	300	995	JR30A-12	N/A	13/16 *	2.5	4.9
MPC7	600	1216	JR30A-12	N/A	1-3/32 *	3.5	5.6
MPC8	650	1438	JR50A-15	N/A	3/4 *	2.0	5.9
MPC9	650	1660	JR50A-15	N/A	Wide Open *	1.5	6.9
MPC10	650	1881	JR50A-15	N/A	3*	1.8	5.8
MPC11	650	2103	JR50A-15	N/A	2-3/8*	2.1	5.0
MPC4	300	500	C1-G-10	3/16	5/16 / Closed	1.8	4.0
MPC5	300	773	C1-G-10	3/8	1 / Closed	3.8	4.4
MPC6	300	995	C1-G-12	1/4	1-3/32 / 1-3/8	2.4	4.8
MPC7	300	1216	C1-G-12	1/4	3/4 / 3/4	3.5	5.5
MPC8	750	1438	C2-G-15	1/4	1 / Closed	1.0	6.0
MPC9	750	1660	C2-G-15	1/4	13/16 / 11/16	1.4	6.8
MPC10	750	1881	C2-G-20A	3/16	Both Wide Open	2.6	5.9
MPC11	750	2103	C2-G-20A	3/8	1-3/8 / 1-1/4	2.0	6.5
MPC12	750	2325	C2-G-20A	3/8	1-3/4 / 1-3/4	2.4	5.7
MPC13	750	2547	C2-G-20B	3/8	1-1/2 / 1-1/4	2.9	6.5
MPC14	750	2769	C2-G-20B	1/2	1-1/4 / 1-1/4	3.0	6.5
MPC15	900	2991	C3-G-20	1/2	1-7/8 / Closed	1.7	5.6
MPC16	900	3213	C3-G-20	5/16	1-3/4 / 1-3/4	2.3	6.9
MPC17	900	3435	C3-G-20	3/8	2 / 2	2.6	6.6
MPC18	900	3657	C3-G-20	3/8	Both Wide Open	2.5	6.8
* ON "JR" BURNERS, THIS DIMENSION IS THE GAP BETWEEN THE TWO DAMPER BLADES.							
** MINIMUM INLET PRESSURE FOR STANDARD UL GAS TRAINS ONLY. CONSULT FACTORY FOR ADDITIONAL INFORMATION.							

Table XIVc: Power Flame Combination Gas / #2 Oil Burner Specifications *

BOILER MODEL	BURNER INPUT **		BURNER MODEL	DIFFUSER OPENING (IN.)	APPROX. HIGH FIRE DAMPER SETTING - TOP / BOTTOM DAMPER (IN.)	APPROX. NAT. GAS MANIFOLD PRESS. AT ORIFICE TEE ("WC)	MINIMUM NAT. GAS INLET PRESS. ("WC) ***
	GAS (MBH)	OIL (GPH)					
MPC4	500	3.55	C1-GO-10	3/16	5/16 / Closed	1.8	4.0
MPC5	773	5.5	C1-GO-10	3/8	1 / Closed	3.8	4.4
MPC6	995	7.1	C1-GO-12	1/4	1-3/32 / 1-3/8	2.4	4.8
MPC7	1216	8.7	C1-GO-12	1/4	3/4 / 3/4	3.5	5.5
MPC8	1438	10.2	C2-GO-15	1/4	1 / Closed	1.0	6.0
MPC9	1660	11.8	C2-GO-15	1/4	13/16 / 11/16	1.4	6.8
MPC10	1881	13.4	C2-GO-20A	3/16	Both Wide Open	2.6	5.9
MPC11	2103	15.0	C2-GO-20A	3/8	1-3/8 / 1-1/4	2.0	6.5
MPC12	2325	16.6	C2-GO-20A	3/8	1-3/4 / 1-3/4	2.4	5.7
MPC13	2547	18.2	C2-GO-20B	3/8	1-1/2 / 1-1/4	2.9	6.5
MPC14	2769	19.8	C2-GO-20B	1/2	1-1/4 / 1-1/4	3.0	6.5
MPC15	2991	21.5	C3-GO-20	1/2	1-7/8 / Closed	1.7	5.6
MPC16	3213	23.0	C3-GO-20	5/16	1-3/4 / 1-3/4	2.3	6.9
MPC17	3435	24.5	C3-GO-20	3/8	2 / 2	2.6	6.6
MPC18	3657	26.0	C3-GO-20	3/8	Both Wide Open	2.5	6.8
* SEE OIL BURNER DATA FOR NOZZLE SIZES AND PUMP PRESSURE SETTINGS.							
** MAXIMUM BURNER INPUT RATES SHOWN. FOR MINIMUM BURNER INPUT RATES, SEE SEPARATE GAS AND OIL BURNER DATA.							
*** MINIMUM INLET PRESSURE FOR STANDARD UL GAS TRAINS ONLY. CONSULT FACTORY FOR ADDITIONAL INFORMATION.							

SECTION VIII - REPAIR PARTS

All MPC™ Repair Parts may be obtained through your local Burnham Commercial Cast Iron Wholesale distributor. Should you require assistance in locating a Burnham Commercial Cast Iron distributor in your area, or have questions regarding the availability of Burnham Commercial Cast Iron products or repair parts, please contact Burnham Commercial Cast Iron Customer Service at (888) 791-3790 or Fax (877) 501-5211.

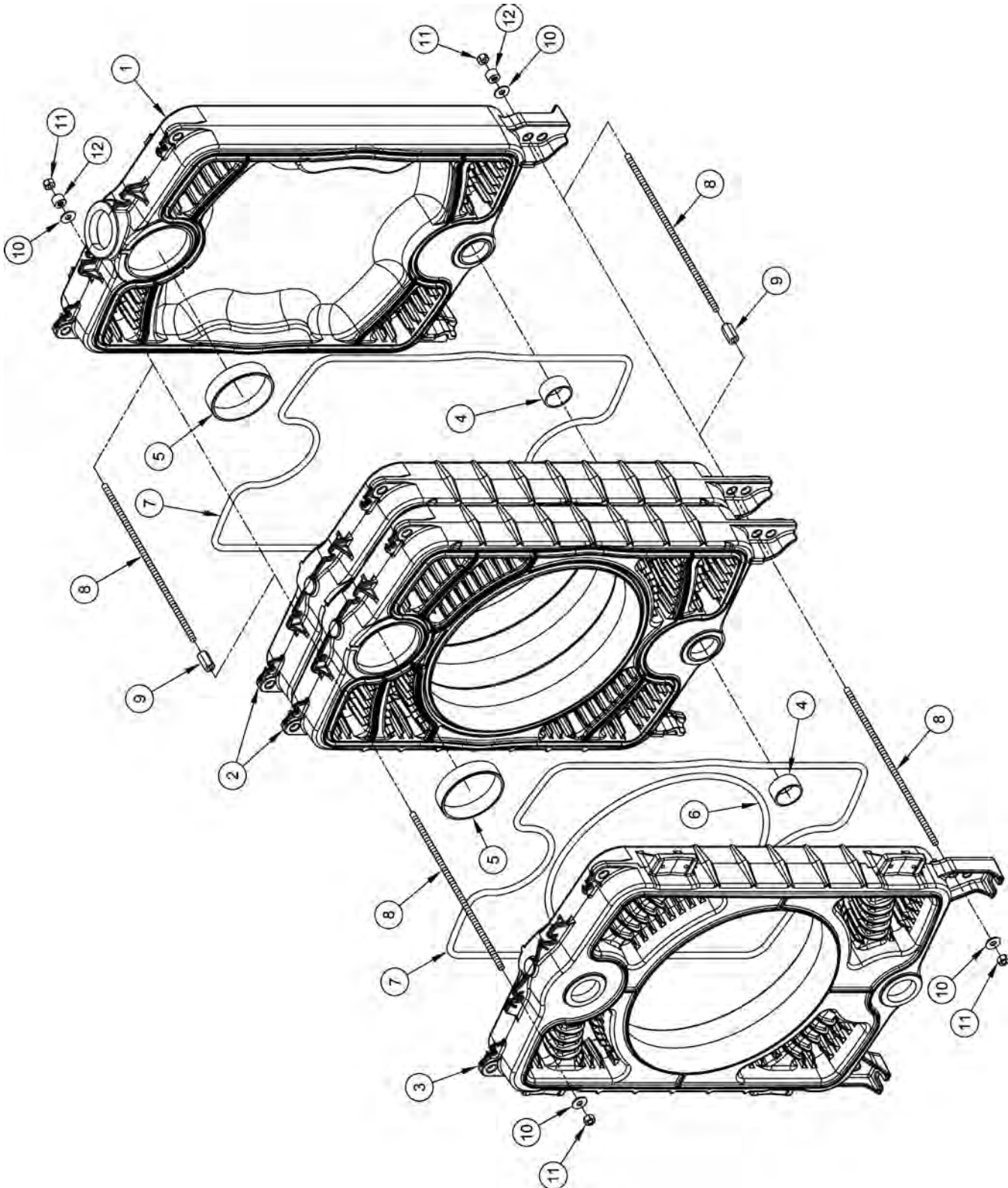


Figure 55: MPC Cast Iron Section Assembly

REPAIR PARTS - CAST IRON SECTION ASSEMBLY

Item No.	Description	Boiler Sections / Quantity																Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18		
1	MPC-R Rear Section (Machined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100658-01	
2	MPC-C Center Section (Machined)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	100657-01	
3	MPC-F Front Section (Machined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100656-01	
4	3" Cast Iron Slip Nipple (Machined)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	7066002	
5	7" Cast Iron Slip Nipple (Machined)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	7066004	
6	5/8" Dia. x 86" Lg. Pre-cut Silicone Coated Combustion Chamber Rope Gasket	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	101635-01	
7	5/8" Dia. x 164" Lg. Pre-cut Silicone Coated Perimeter Rope Gasket	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	101635-03	
8	Tie Rods:																	
	8A. 5/8" - 11 x 24-1/4" Lg.	4				4	4			4							101753-01	
	8B. 5/8" - 11 x 31" Lg.		4					4			4					4	101754-01	
	8C. 5/8" - 11 x 37-3/4" Lg.			4					4			4					101755-01	
	8D. 5/8" - 11 x 45-1/2" Lg.				4					4			4	4			101756-01	
	8E. 5/8" - 11 x 27" Lg.																80861022	
	8F. 5/8" - 11 x 34" Lg.																80861083	
9	5/8" - 11 x 2-1/8" Coupling Hex Nut, Plated					4	4	4	4	4	8	8	8	8	8	12	80860455	
10	5/8" Flat Washer, USS, Plain	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	80860608	
11	5/8" x 11 Hex Nut, Plain	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	80860460	
12	Tie Rod Tension Spring Assembly	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	101701-01	

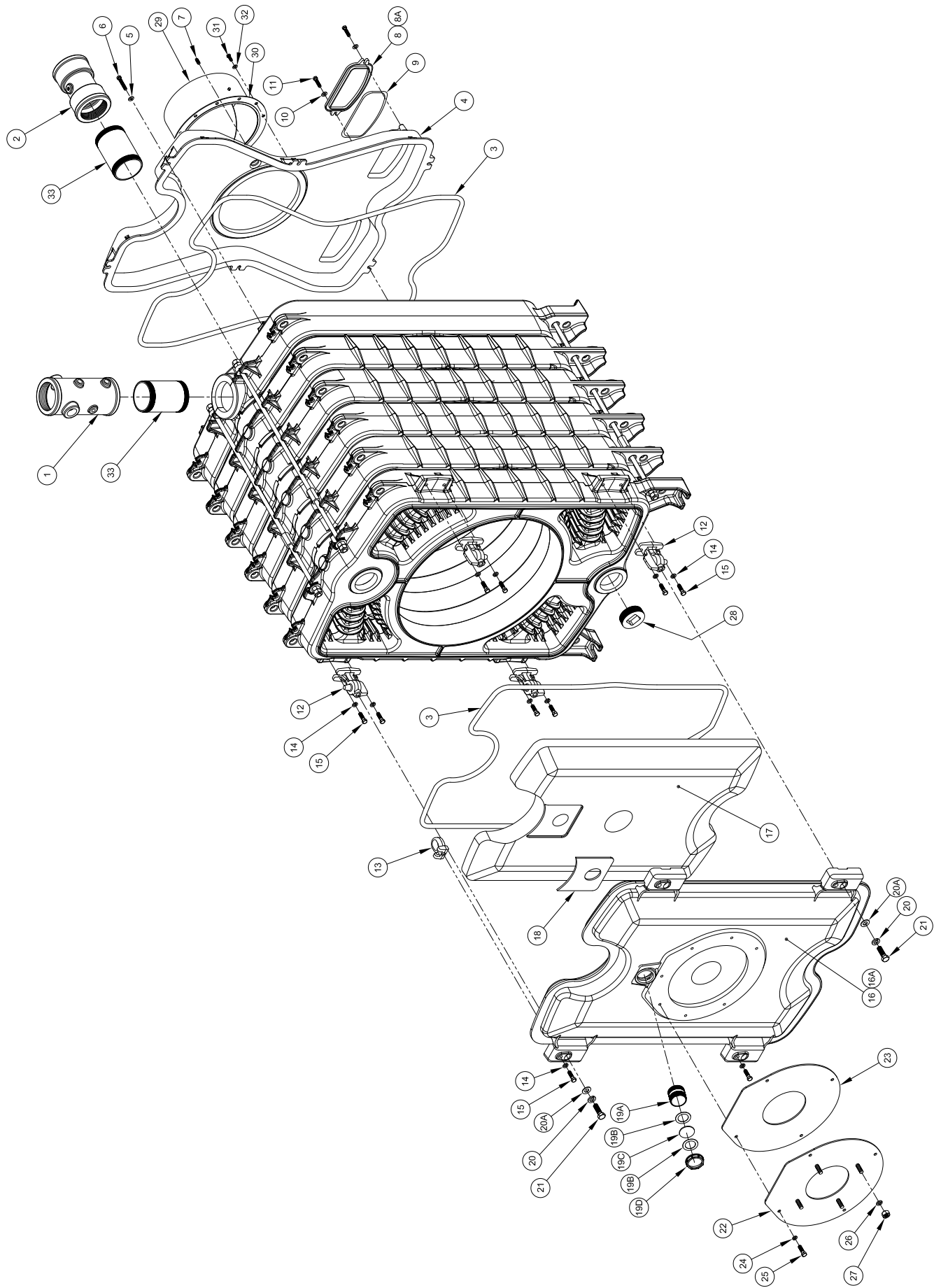


Figure 56: MPC Common Bare Boiler Components

REPAIR PARTS - COMMON BARE BOILER COMPONENTS

Item No.	Description	Boiler Sections / Quantity																Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18		
1	4" NPT CI Supply Manifold	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	706MPC401	
2	4" NPT CI Return Manifold	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	706MPC402	
3	5/8" x 158" Lg. Pre-Cut Silicone Coated Rope Gasket (BSD & Flue Collector)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101635-02	
4	Cast Iron Rear Flue Collector, Machined	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100743-01	
5	3/8" Flat Washer, USS, Plated	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	80860618	
6	3/8" -16 x 1-1/4" Lg. Hex Head Cap Screw, Plain	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	80861309	
7	1/4" NPT Square Head Plug, Pipe, Brass	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	806603542	
8	Cast Iron Clean-out Cover Assembly (Includes Items 8A & 9)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101667-01	
8A	Cast Iron Clean-out Cover, Painted	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101899-01	
9	1/2" Dia. x 24-1/2" Lg. Pre-Cut Silicone Coated Rope Gasket, (Clean-out Cover)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101634-01	
10	5/16" Flat Washer, USS, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860611	
11	5/16" -18 x 7/8" Lg. Hex Head Cap Screw, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80861371	
12	BSD Hinge/Latch (Machined)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	100731-01	
13	BSD Hinge Loop (Machined)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	100732-01	
14	7/16" Split-Lock Washer, Plated	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	101758-01	
15	7/16" -14 x 1-1/2" Lg. Hex Head Cap Screw, Plated	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	101759-01	
16	Burner Swing Door Assembly (Includes Items 16A, 17 & 18)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100688-01	
16A	Burner Swing Door, Machined & Painted	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	102647-01	
17	Burner Swing Door Insulation (RCF)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100691-01	
18	Internal BSD Observation Port Gasket (RCF)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101518-01	
19	Observation Port Components:																	
	19A. 2" NPT x 2-1/2" Lg. Observation Port Nipple	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8066000101	
	19B. Sight Glass Fiber Gasket (RCF)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8026083	
	19C. Pyrex Sight Glass	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8026082	
	19D. 2" Conduit Bushing Observation Port Cap, Plated	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	806600518	

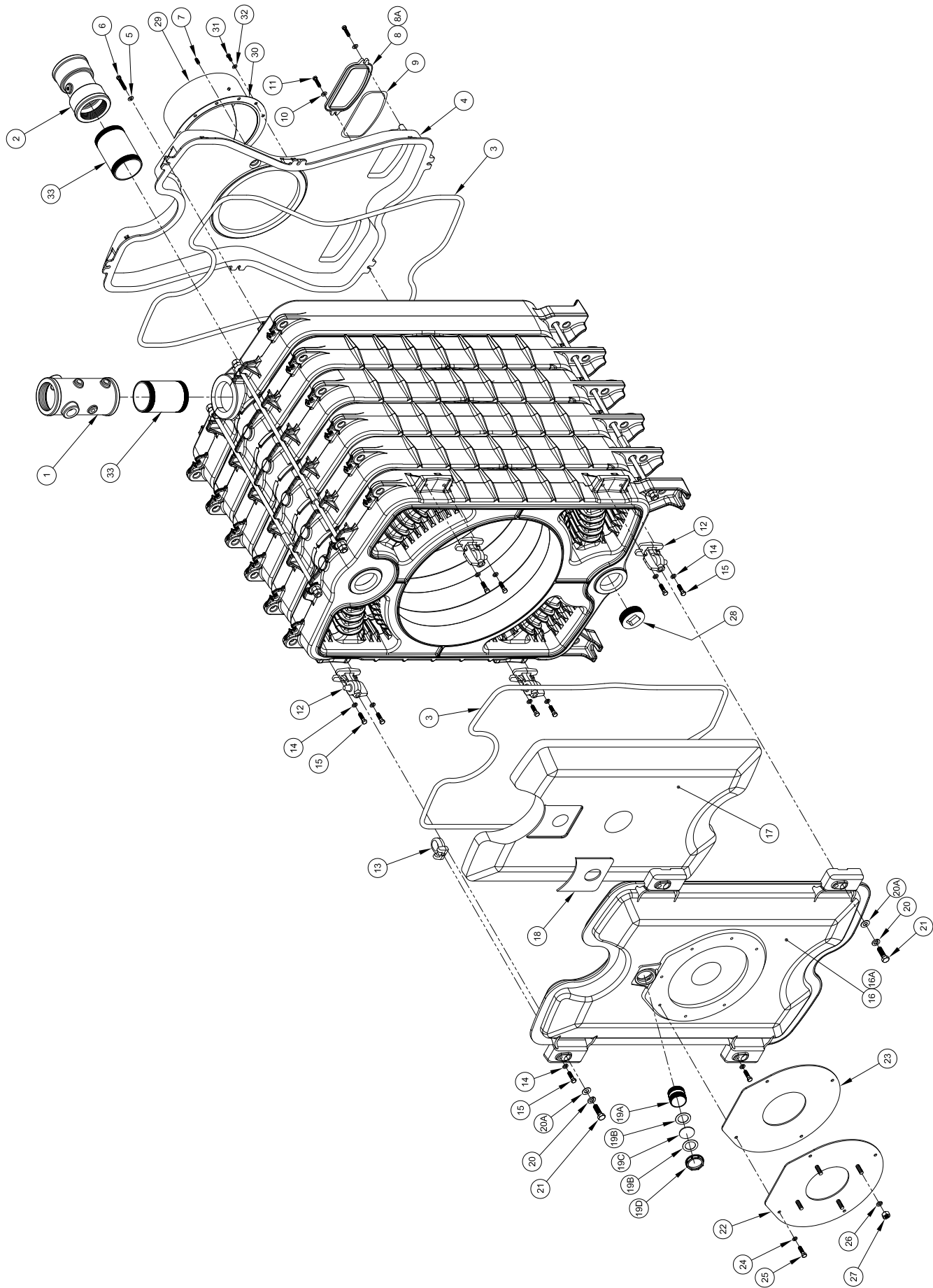


Figure 56: MPC Common Bare Boiler Components (continued)

REPAIR PARTS - COMMON BARE BOILER COMPONENTS (continued)

Item No.	Description	Boiler Sections / Quantity																Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18		
20	9/16" Split-Lock Washer, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	101760-01	
20A	5/8" Flat Washer	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860608	
21	9/16" -12 x 2" Lg. Hex Head Cap Screw, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	101761-01	
22	Burner Adapter Plate Cartons (Includes Item 23):																	
	Oil Burner																	
	22A. Beckett ("CF") BAP No. "00", 6-3/4" Dia. Hole	1	1	1	1												602263001	
	22B. Beckett ("CF") BAP No. "01", 8-1/4" Dia. Hole					1	1	1	1	1	1	1	1				602263011	
	22C. Beckett ("CF") BAP No. "02", 10-1/4" Dia. Hole												1	1	1	1	602263021	
	Gas Burner																	
	22D. Beckett ("CG") BAP No. "03", 5" Dia. Hole	1	1														602263031	
	22E. Beckett ("CG") BAP No. "04", 6" Dia. Hole		1	1													602263041	
	22F. Beckett ("CG") BAP No. "07", 7-1/4" Dia. Hole					1	1	1	1	1							602263071	
	22G. Beckett ("CG") BAP No. "08", 8-1/8" Dia. Hole										1	1	1	1	1	1	602263081	
	- OR -																	
	Oil, Gas, Gas/Oil Combo Burner																	
	22H. Power Flame ("C") BAP No. "40", 7-1/2" Dia. Hole	1	1	1	1												602263401	
	22 I. Power Flame ("C") BAP No. "41", 9" Dia. Hole					1	1	1	1	1	1	1					602263411	
	22J. Power Flame ("C") BAP No. "42", 10-3/8" Dia. Hole												1	1	1	1	602263421	
	- OR -																	
	Gas Burner																	
	22K. Power Flame ("JR") BAP No. "45", 6-3/8" Dia. Hole	1	1	1	1					1	1	1	1	1	1	1	602263451	
	22L. Power Flame ("JR") BAP No. "41", 9" Dia. Hole									1	1	1	1	1	1	1	602263411	
23	Burner Adapter Plate Gasket (RCF)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8022601	
24	3/8" Split-Lock Washer, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860650	
25	3/8" -16 x 7/8" Lg. Hex Head Cap Screw, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80861352	
26	1/2" Flat Washer (USS), Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860641	
27	1/2"-13 Hex Nut, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860471	
28	3" NPT Countersunk Pipe Plug, Black	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	806603509	
29	Flue Outlet Damper Assembly, 7"	1	1														102471-01	
	Flue Outlet Damper Assembly, 8"		1	1	1												102471-02	
	Flue Outlet Damper Assembly, 10"					1	1	1	1								102471-03	
	Flue Outlet Damper Assembly, 12"									1	1	1	1	1	1	1	102471-04	
30	Flue Outlet Damper Mounting Gasket	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	102472-01	
31	Hex Head Cap Screw 5/16 - 18 x 7/8" Plated	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	80861371	
32	Washer, Flat, 1/4" USS, Plated	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	80860803	
33	4" NPT x 8" Lg - Supply/Return	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	806600603	

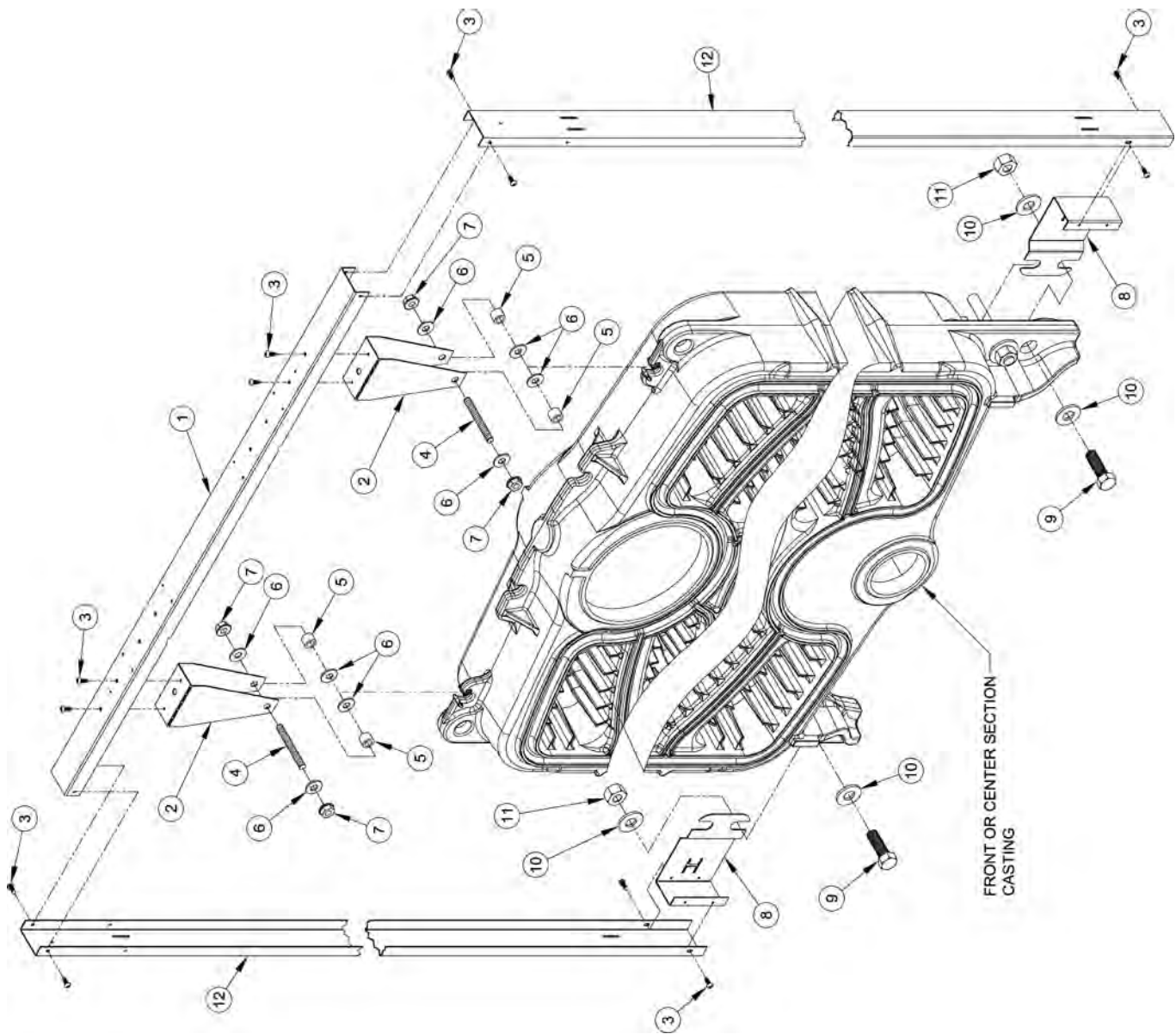


Figure 57: MPC Front & Center Section Frame Rail Assembly

REPAIR PARTS - FRONT & CENTER SECTION FRAME RAIL ASSEMBLY

Item No.	Description	Boiler Sections / Quantity																Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18		
1	Jacket Frame-Horizontal Support Channel	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	100758-01	
2	Jacket Frame-Horizontal Support Channel Bracket	2	2	2	4	4	4	4	4	6	6	6	6	6	8	8	100757-01	
3	#8 x 1/2" Lg. Type AB, Slotted Hex Washer Head Sheet Metal Screw, Steel, Plated	12	12	12	24	24	24	24	24	36	36	36	36	36	48	48	80860018	
4	3/8" -16 x 3-1/2" Lg. Threaded Rod	2	2	2	4	4	4	4	4	6	6	6	6	6	8	8	101596-01	
5	11/16" OD x 7/16" ID x 17/32" Lg. Spacer	4	4	4	8	8	8	8	8	12	12	12	12	12	20	20	101597-01	
6	3/8" Flat Washer, USS, Plated	8	8	8	16	16	16	16	16	24	24	24	24	24	32	32	80860618	
7	3/8" -16 Serrated Flange Hex Nut, Steel, Plated	4	4	4	8	8	8	8	8	12	12	12	12	12	16	16	80860498	
8	Jacket Frame-Lower Front/Center Bracket	2	2	2	4	4	4	4	4	6	6	6	6	6	8	8	100760-01	
9	5/8" -11 x 2" Lg. Hex Head Bolt, Plain	2	2	2	4	4	4	4	4	6	6	6	6	6	8	8	80860887	
10	5/8" Flat Washer, USS, Plain	4	4	4	8	8	8	8	8	12	12	12	12	12	16	16	80860608	
11	5/8" -11 Hex Nut, Plain	2	2	2	4	4	4	4	4	6	6	6	6	6	8	8	80860460	
12	Jacket Frame-Vertical Side Channel (Painted)	2	2	2	4	4	4	4	4	6	6	6	6	6	8	8	100759-01	

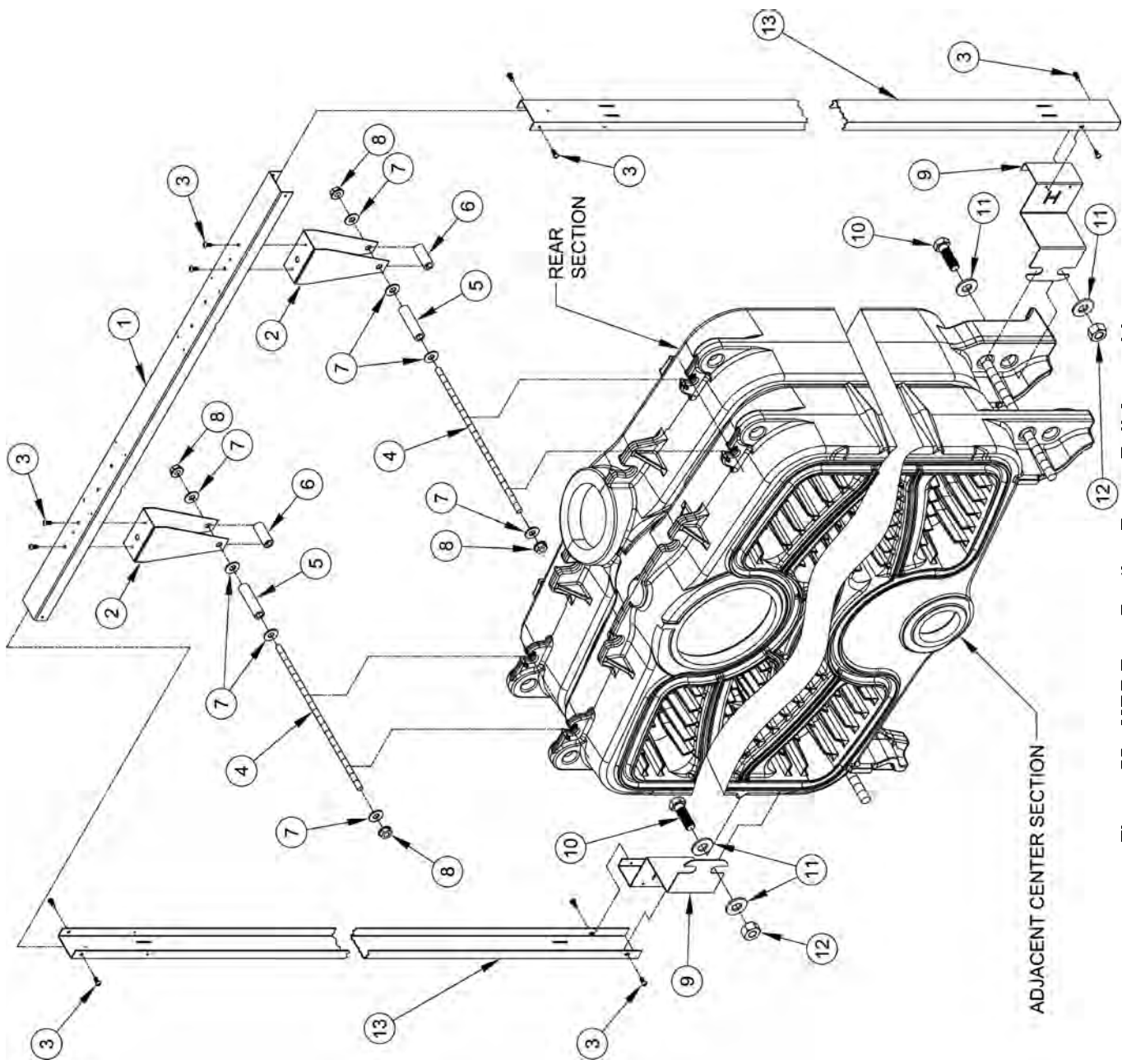


Figure 58: MPC Rear Section Frame Rail Assembly

REPAIR PARTS - REAR SECTION FRAME RAIL ASSEMBLY

Item No.	Description	Boiler Sections / Quantity															Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	
1	Jacket Frame-Horizontal Support Channel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100758-01
2	Jacket Frame-Horizontal Support Channel Bracket	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	100757-01
3	#8 x 1/2" Lg. Type AB, Slotted Hex Washer Head Sheet Metal Screw, Steel, Plated	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	80860018
4	3/8" -16 x 13-3/4" Lg. Threaded Rod	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101596-02
5	11/16" OD x 7/16" ID x 2-21/32" Lg. Spacer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101597-03
6	11/16" OD x 7/16" ID x 1-23/32" Lg. Spacer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101597-02
7	3/8" Flat Washer, USS, Plated	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	80860618
8	3/8" -16 Serrated Flange Hex Nut, Steel, Plated	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860498
9	Jacket Frame-Lower Rear Bracket	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	100761-01
10	5/8" -11 x 2" Lg. Hex Head Bolt, Plain	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	80860887
11	5/8" Flat Washer, USS, Plain	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80860608
12	5/8" -11 Hex Nut, Plain	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	80860460
13	Jacket Frame-Vertical Side Channel (Painted)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	100759-01

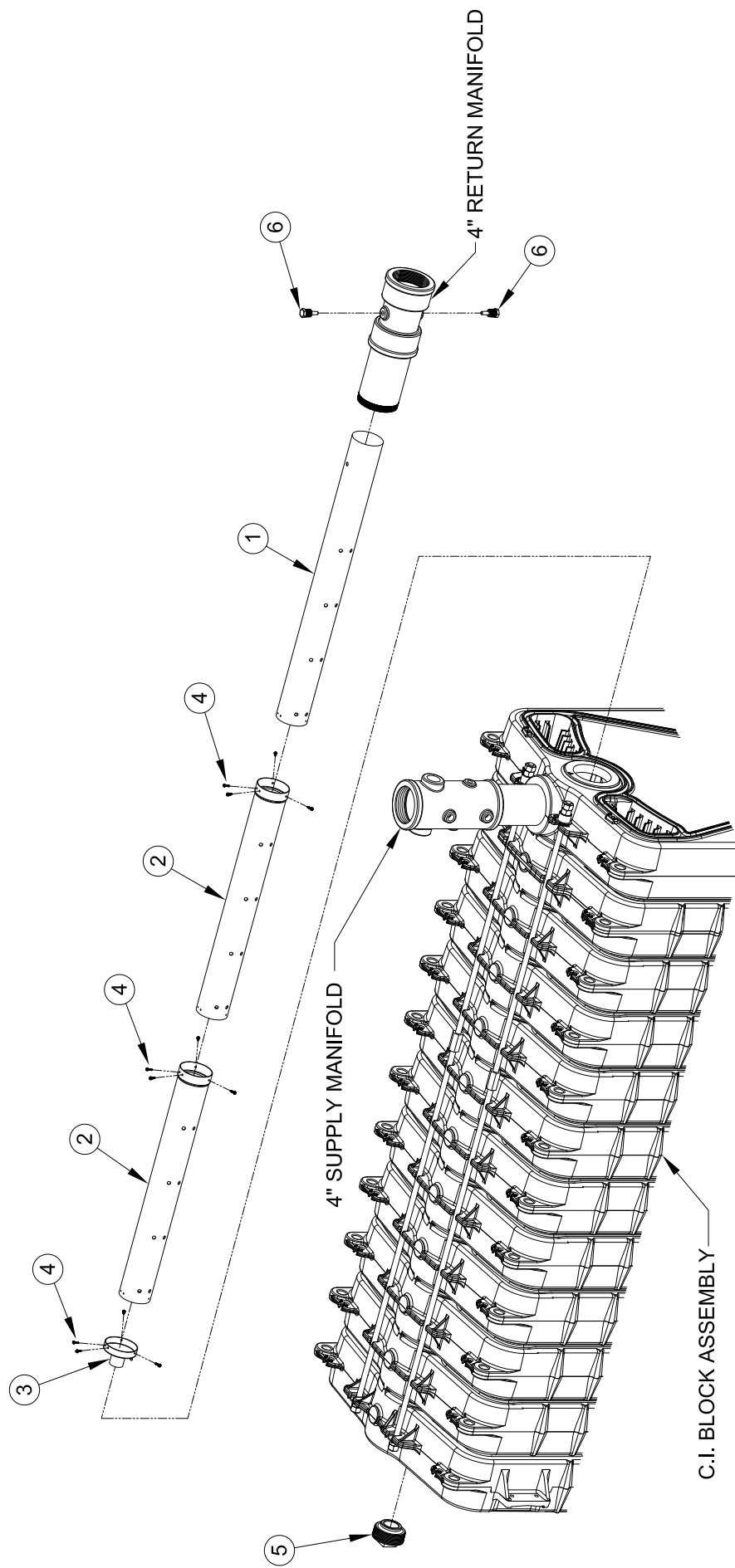


Figure 59: MPC Return Water Mixing Tube RC Assembly

REPAIR PARTS - RETURN WATER MIXING TUBE RC ASSEMBLY

Boiler Model	Return Water Mixing Tube Assembly, Flared Collar				Return Water Mixing Tube Assembly, Square End			Total Tubes Required
	102789-01 (17-13/16)	102790-01 (18)	100727-01 (21-5/16)	100727-02 (28-1/16)	102788-03 (18-3/4)	102788-01 (22-1/8)	102788-02 (28-3/4)	
MPC4		1				1		2
MPC5		1					1	2
MPC6	1	1				1		3
MPC7		1	1					3
MPC8		1	1				1	3
MPC9	1	1	1		1			4
MPC10	1	1		1	1			4
MPC11	2	2			1			5
MPC12		1		2		1		4
MPC13		1		2			1	4
MPC14	1	1		2		1		5
MPC15	2	3					1	6
MPC16	3	3				1		7
MPC17	2	3	1				1	7
MPC18	2	3	1				1	7

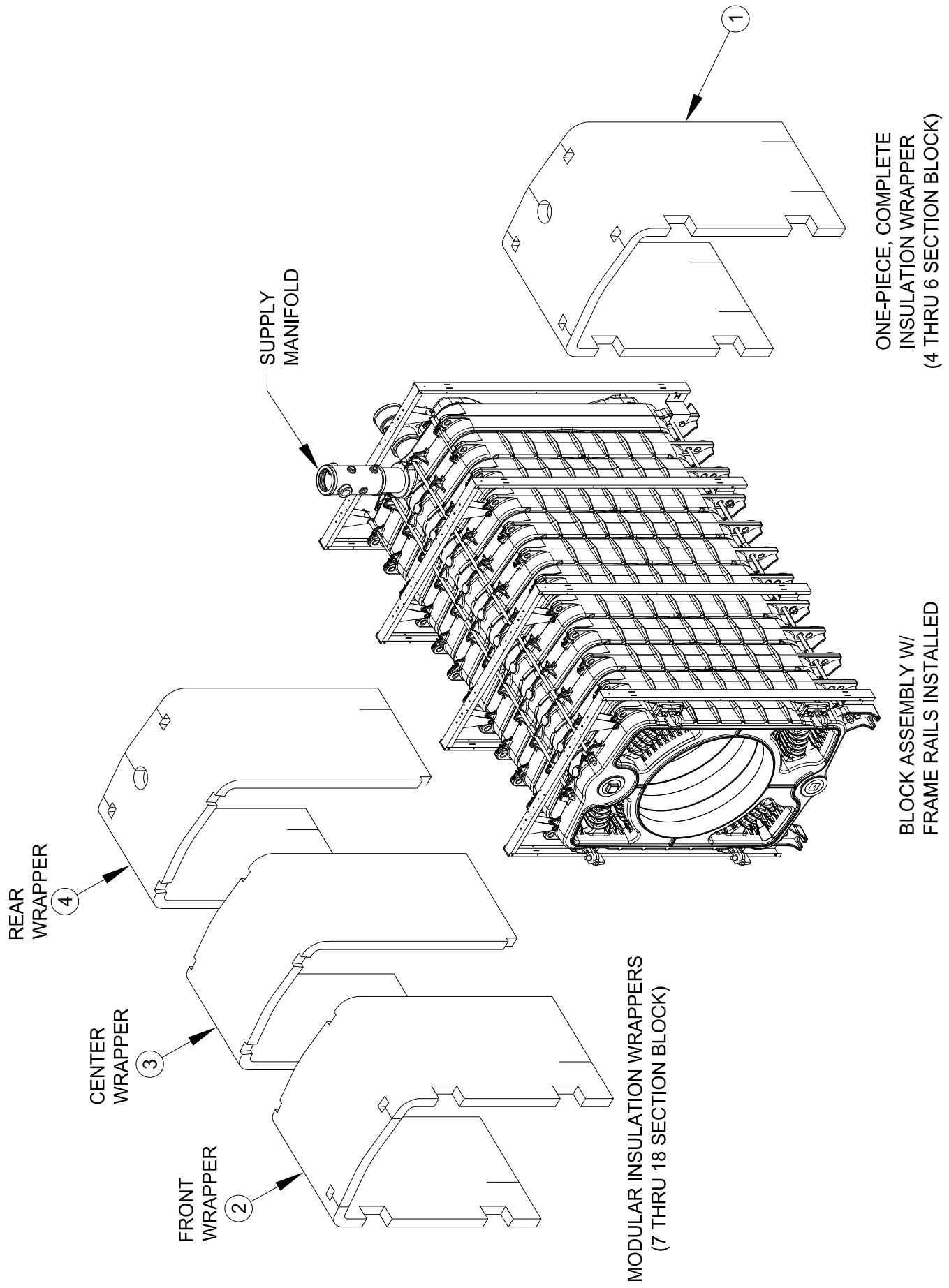


Figure 60: MPC Heat Exchanger Insulation Wrapper

REPAIR PARTS - HEAT EXCHANGER INSULATION WRAPPER

Item No.	Description	Boiler Sections / Quantity																	Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18			
1	Complete Heat Exchanger Wrapper Insulation																		
	1A. 4" Thk Nominal x 32-5/8" x 140-3/4" Lg.	1																	
	1B. 4" Thk Nominal x 39-3/8" x 140-3/4" Lg.		1																
	1C. 4" Thk Nominal x 46-1/8" x 140-3/4" Lg.			1															
2	Front Heat Exchanger Wrapper Insulation																		
	2A. 4" Thk Nominal x 24-5/8" x 140-3/4" Lg.				1														
	2B. 4" Thk Nominal x 31-3/8" x 140-3/4" Lg.					1	1	1	1	1	1	1			1	1			
	2C. 4" Thk Nominal x 38-1/8" x 140-3/4" Lg.						1	1	1	1	1	1	1	1					
3	Center Heat Exchanger Wrapper Insulation																		
	3A. 4" Thk Nominal x 27" x 140-3/4" Lg.								1	1	1				2	1			
	3B. 4" Thk Nominal x 33-3/4" x 140-3/4" Lg.										1	1	1	1	1	1			
4	Rear Heat Exchanger Wrapper Insulation																		
	4A. 4" Thk Nominal x 28-1/4" x 140-3/4" Lg.			1	1					1									
	4B. 4" Thk Nominal x 35" x 140-3/4" Lg.						1	1	1	1	1	1	1	1	1	1			
	4C. 4" Thk Nominal x 41-3/4" x 140-3/4" Lg.								1					1					

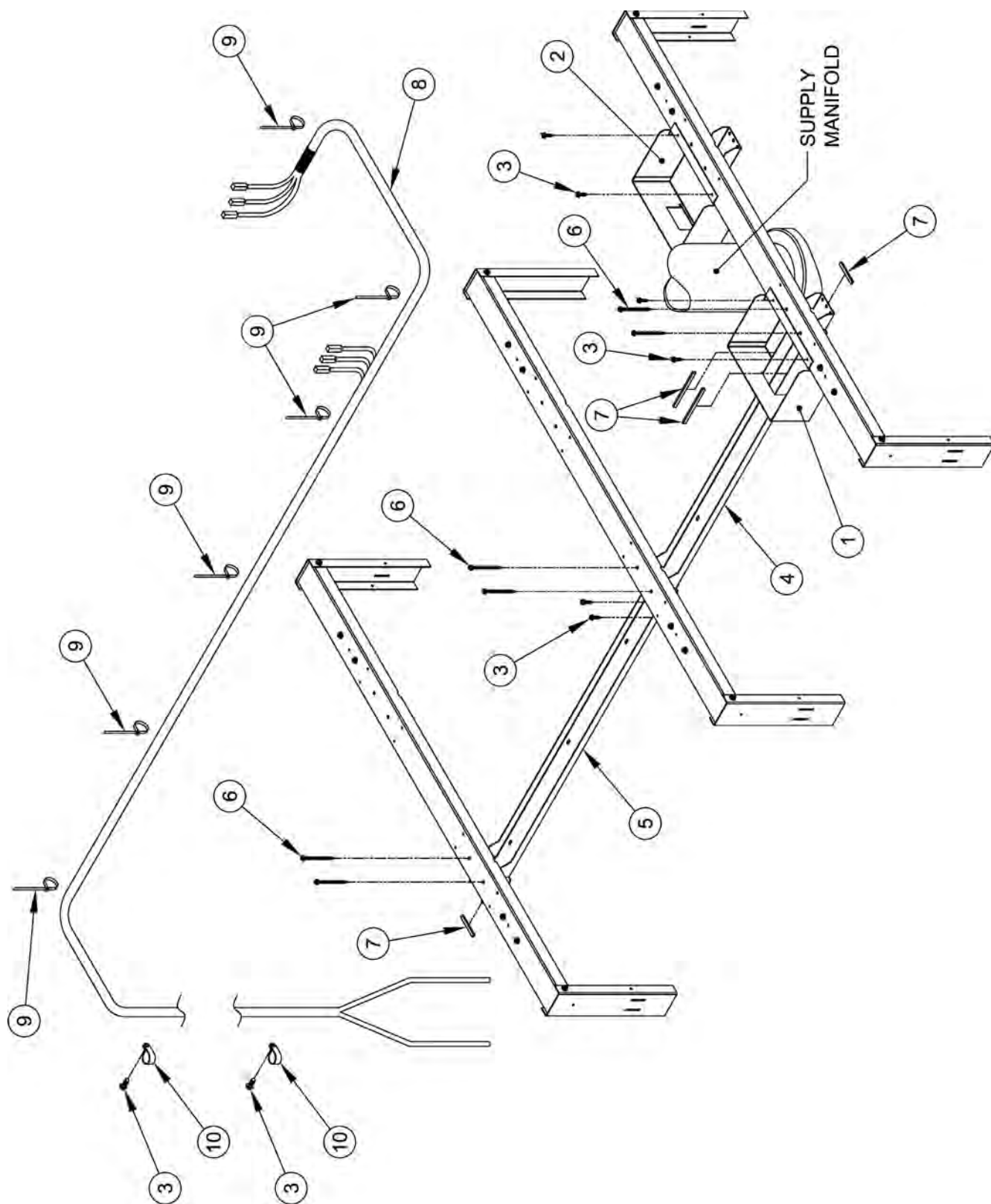


Figure 61: MPC Internal Wiring Harness Components

REPAIR PARTS - INTERNAL WIRING HARNESS COMPONENTS

Item No.	Description	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	Part No.
1	Primary Internal J-Box	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101418-01
2	Secondary Internal J-Box Assy. w/Securing Channel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101533-01
3	#8 x 1/2" Lg. Type AB Slotted Hex Hd Washer Sheet Metal Screw, Plated	6	6	6	8	8	8	8	8	10	10	10	10	10	12	12	80860018
4	Main Chase-way Channel:																
	4A. 27-9/16" Lg.	1		1	1	1				1							101432-01
	4B. 34-5/16" Lg.	1					1	1		1	1	1	1	1	1	1	101432-02
	4C. 41-1/16" Lg.		1						1					1			101432-03
5	Chase-way Channel Extension:																
	5A. 20-5/16" Lg.			1													101519-01
	5B. 27-1/16" Lg.					1	1			2	2	1			3	2	101519-02
	5C. 33-13/16" Lg.							1	1			1	2	2		1	101519-03
6	#8 x 2-1/2" Lg. Type AB Slotted Hex Hd Washer Screw, SM, Steel, Plated	4	4	4	6	6	6	6	6	8	8	8	8	8	10	10	101757-01
7	7/64" Push On Plastic Edge Trim, Polyethylene, Blk, (Cut Length = 16" Lg.)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101846-01
8	Internal Wiring Harness Assembly:																
	8A. MPC4 Thru MPC8	1	1	1	1	1											101438-01
	8B. MPC9 Thru MPC13						1	1	1	1	1						101438-02
	8C. MPC14 Thru MPC18											1	1	1	1	1	101438-03
9	Nylon Cable Tie, Black, T&B #TY-525M or Equivalent	6	6	6	9	9	9	9	9	12	12	12	12	12	15	15	8136050
10	5/8" Dia. Cable Clamp, Black, Heyco #3380 or Equivalent	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8136077

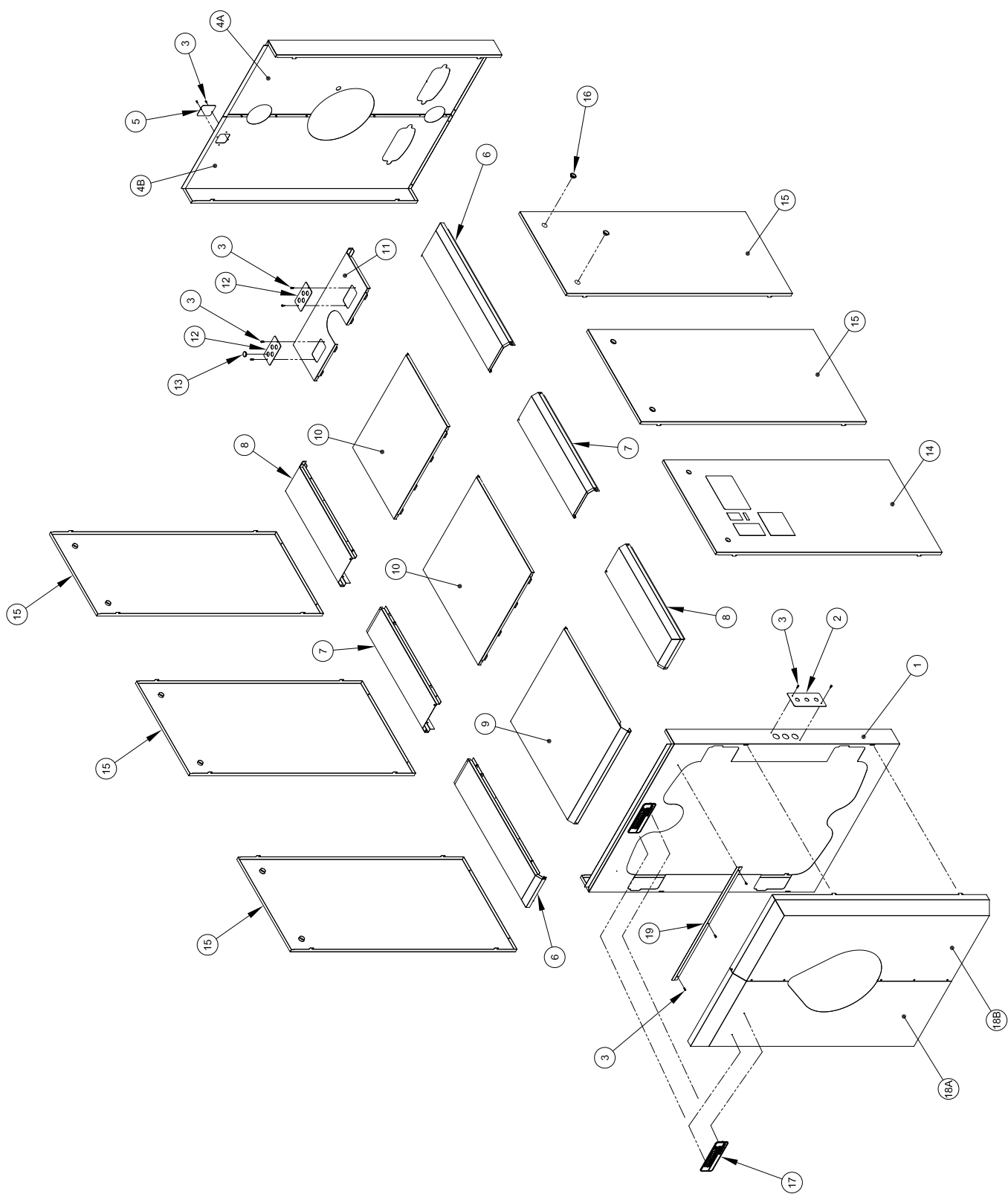


Figure 62: MPC Jacket Panel Assembly

REPAIR PARTS - JACKET PANEL ASSEMBLY

Item No.	Description	Boiler Sections / Quantity																Part No.		
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18				
1	Jacket Front Panel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100753-01			
2	Jacket Front Panel Wiring Harness Cover Plate	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101422-01			
3	#8 x 2-1/2" Lg. Type AB, Slotted Hex Washer Head Sheet Metal Screw, Steel, Plated	38	38	38	46	46	46	46	46	58	58	58	58	70	70	70	80860018			
4A	Jacket Left Rear Panel Assy. w/ Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101709-01			
4B	Jacket Right Rear Panel Assy. w/ Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101708-01			
5	Jacket Blank Sensor J-Box Cover	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101427-01			
6	Jacket Outer Top Corner Panel Assembly with Short & Long Brackets:																			
	6A. 27" Lg.	2																100765-01		
	6B. 33-3/4" Lg.	2			2	2			2	2	2	2	2	2	2	2	100765-02			
	6C. 40-1/2" Lg.			2											2	2	100765-03			
7	Jacket Outer Top Intermediate Panel Assembly with Long Brackets:																			
	7A. 27-1/16" Lg.											2	2			4	2	100764-01		
	7B. 33-13/16" Lg.														2	2	2	2	100764-02	
8	Jacket Outer Top Corner Panel Assembly with Short Brackets:																			
	8A. 6-11/16" Lg.	2	2	2														100763-01		
	8B. 27" Lg.					2	2											2	100763-02	
	8C. 33-3/4" Lg.											2	2	2	2	2	2	2	2	100763-03
	8D. 40-1/2" Lg.													2					2	100763-04
9	Jacket Front Top Panels:																			
	9A. 22-5/16" Lg.	1																100736-01		
	9B. 29-1/16" Lg.	1					1	1	1	1	1	1	1	1	1	1	1	100736-02		
	9C. 35-13/16" Lg.			1											1	1	1	1	100736-03	
10	Jacket Intermediate Top Panels:																			
	10A. 20-5/16" Lg.																	100737-01		
	10B. 27-1/16" Lg.					1	1	1	1	1	2	2	2	3	3	3	3	100737-02		
	10C. 33-13/16" Lg.																	100737-03		

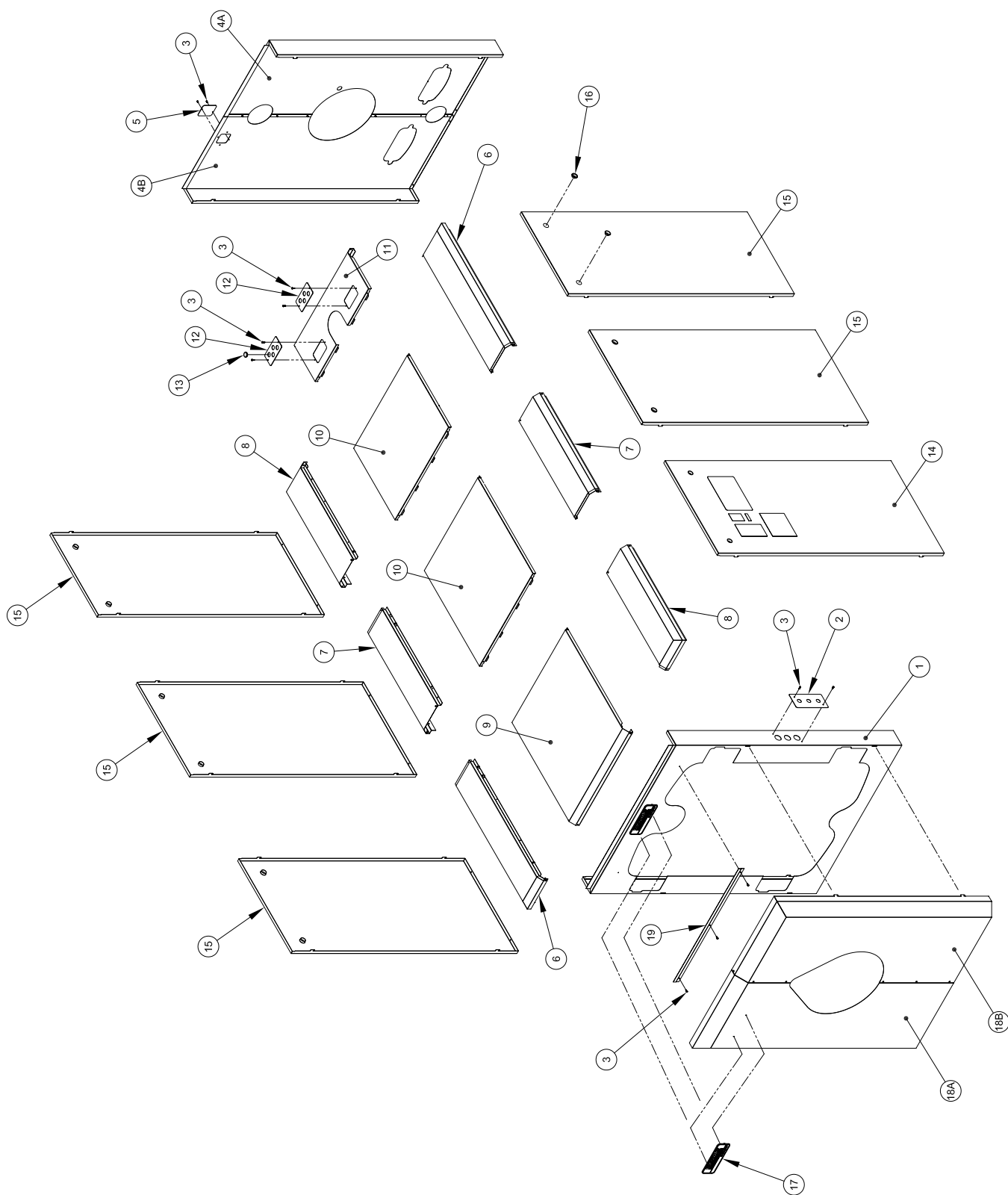


Figure 62: MPC Jacket Panel Assembly (continued)

REPAIR PARTS - JACKET PANEL ASSEMBLY (continued)

Item No.	Description	Boiler Sections / Quantity																Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18		
11	Jacket Rear Top Panel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100735-01	
12	Internal J-Box Cover Plate	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	101190-01	
13	7/8" Dia. Black Snap-in Plug, Alliance #S-78	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	100091-01	
14	Jacket Side Panel Assemblies with Labels:																	
	14A. 19-7/16" x 55-5/16"				1												101767-06	
	14B. 23-3/16" x 55-5/16"	1															101767-01	
	14C. 26-3/16" x 55-5/16"					1	1			1	1	1			1	1	101767-02	
	14D. 29-15/16" x 55-5/16"	1															101767-03	
	14E. 32-15/16" x 55-5/16"							1	1				1	1			101767-04	
	14F. 36-11/16" x 55-5/16"		1														101767-05	
15	Jacket Side Panels:																	
	15A. 19-7/16" x 55-5/16"				1												100746-01	
	15B. 23-3/16" x 55-5/16"	1		2	2					2							100746-02	
	15C. 26-3/16" x 55-5/16"					1	1			3	3	1			5	3	100746-03	
	15D. 29-15/16" x 55-5/16"	1					2	2			2	2	2		2	2	100746-04	
	15E. 32-15/16" x 55-5/16"							1	1			2	3	3		2	100746-05	
	15F. 36-11/16" x 55-5/16"			1					2					2			100746-06	
16	Snap-Bushing, Heyco SB-1093-15, #2166, Black	4	4	4	8	8	8	8	8	8	12	12	12	12	16	16	8136257	
17	MPC Logo Name Plate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101640-01	
18A	Jacket Left Front BSD Cover Panel Assy.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100748-01	
18B	Jacket Right Front BSD Cover Panel Assy.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100749-01	
19	Jacket BSD Cover Hanger Bracket	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100750-01	

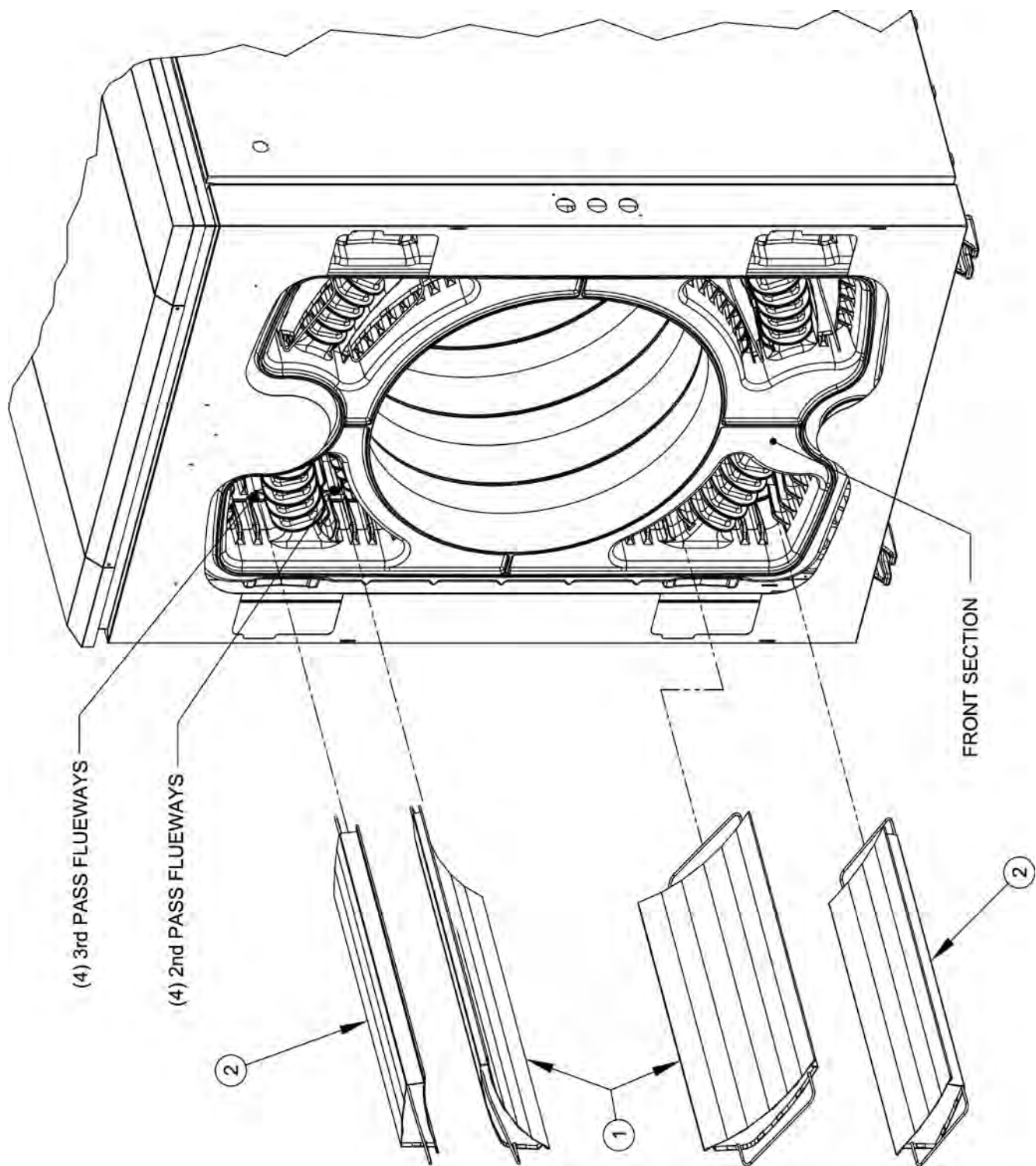


Figure 63: MPC 2nd and 3rd Pass Flueway Baffles

REPAIR PARTS - MPC 2ND AND 3RD PASS FLUEWAY BAFFLES

Item No.	Description	Boiler Sections / Quantity																	Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18			
1	2 nd Pass Flueway Baffles, 304 Stainless Steel:																		
	1A. 18" 2P Baffle Assembly w/Handles	4															101647-01		
	1B. 24 ³ / ₄ " 2P Baffle Assembly w/Handles		4														101647-02		
	1C. 31 ¹ / ₂ " 2P Baffle Assembly w/Handles			4													101647-03		
	1D. 38 ¹ / ₄ " 2P Baffle Assembly w/Handles				4												101647-04		
	1E. 45" 2P Baffle Assembly w/Handles					4											101647-05		
	1F. 51 ³ / ₄ " 2P Baffle Assembly w/Handles						4										101647-06		
	1G. 58 ¹ / ₂ " 2P Baffle Assembly w/Handles							4	4						4		101647-07		
	1H. 65 ¹ / ₄ " 2P Baffle Assembly w/Handles												4	4			101647-08		
	1J. 72" 2P Baffle Assembly w/Handles										4		4				101647-09		
	1K. 78 ³ / ₄ " 2P Baffle Assembly w/Handles											4					101647-10		
2	3 rd Pass Flueway Baffle Assembly w/Handles, 25-1/4" Lg., Cold Rolled Steel	4	4	4	4	4	4	4	4	4							101652-01		

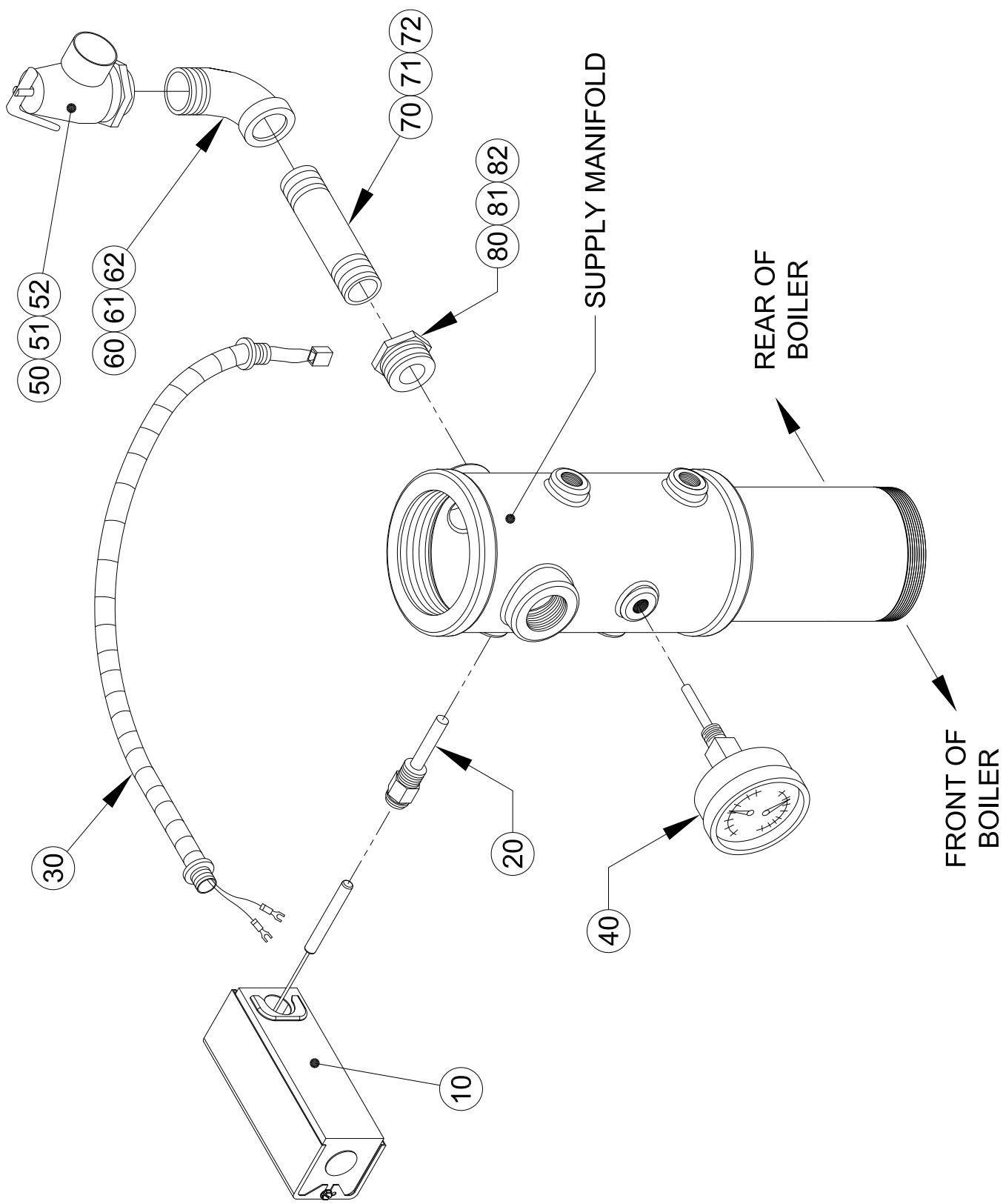


Figure 64: MPC Standard 50 PSI Trim & Control with 30 PSI and 80 PSI Working Pressure Trim Options

REPAIR PARTS - STANDARD WATER TRIM & CONTROL AND OPTIONAL WORKING PRESSURE TRIM

Item No.	Description	Boiler Sections / Quantity																	Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18			
10	Operating Control, Honeywell L4006A2015	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160400		
20	Immersion Well, Honeywell 123871A, 3/4" x 3" Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160452		
30	Wiring Harness, Operating Control	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101385-01		
40	Temperature/Pressure Gauge, 3 1/4" Dia., 1/2" NPT, 0-100 PSI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8056028		
50	Relief Valve, 50 PSI:																		
	50A. Conbraco #10-614-10, 3/4" x 1"	1	1	1	1	1	1										81660359		
	50B. Conbraco #10-615-10, 1" x 1 1/4"							1	1	1	1						81660362		
	50C. Conbraco #10-616-10, 1 1/4" x 1 1/2"											1	1	1	1	1	81660357		
60	Street Elbow, Black Malleable:																		
	60A. 3/4" x 90°	1	1	1	1	1	1										806601501		
	60B. 1" x 90°							1	1	1	1						806601514		
	60C. 1 1/4" x 90°											1	1	1	1	1	806601516		
70	Nipple, SCH.40, Black:																		
	70A. 3/4" x 3 1/2" Lg.	1	1	1	1	1	1										806600038		
	70B. 1" x 4" Lg.							1	1	1	1						806600026		
	70C. 1 1/4" x 4" Lg.											1	1	1	1	1	806600028		
80	Reducing Bushing, Black Malleable:																		
	80A. 1 1/2" x 3/4"	1	1	1	1	1	1										806600507		
	80B. 1 1/2" x 1"							1	1	1	1						806600521		
	80C. 1 1/2" x 1 1/4"											1	1	1	1	1	806600539		

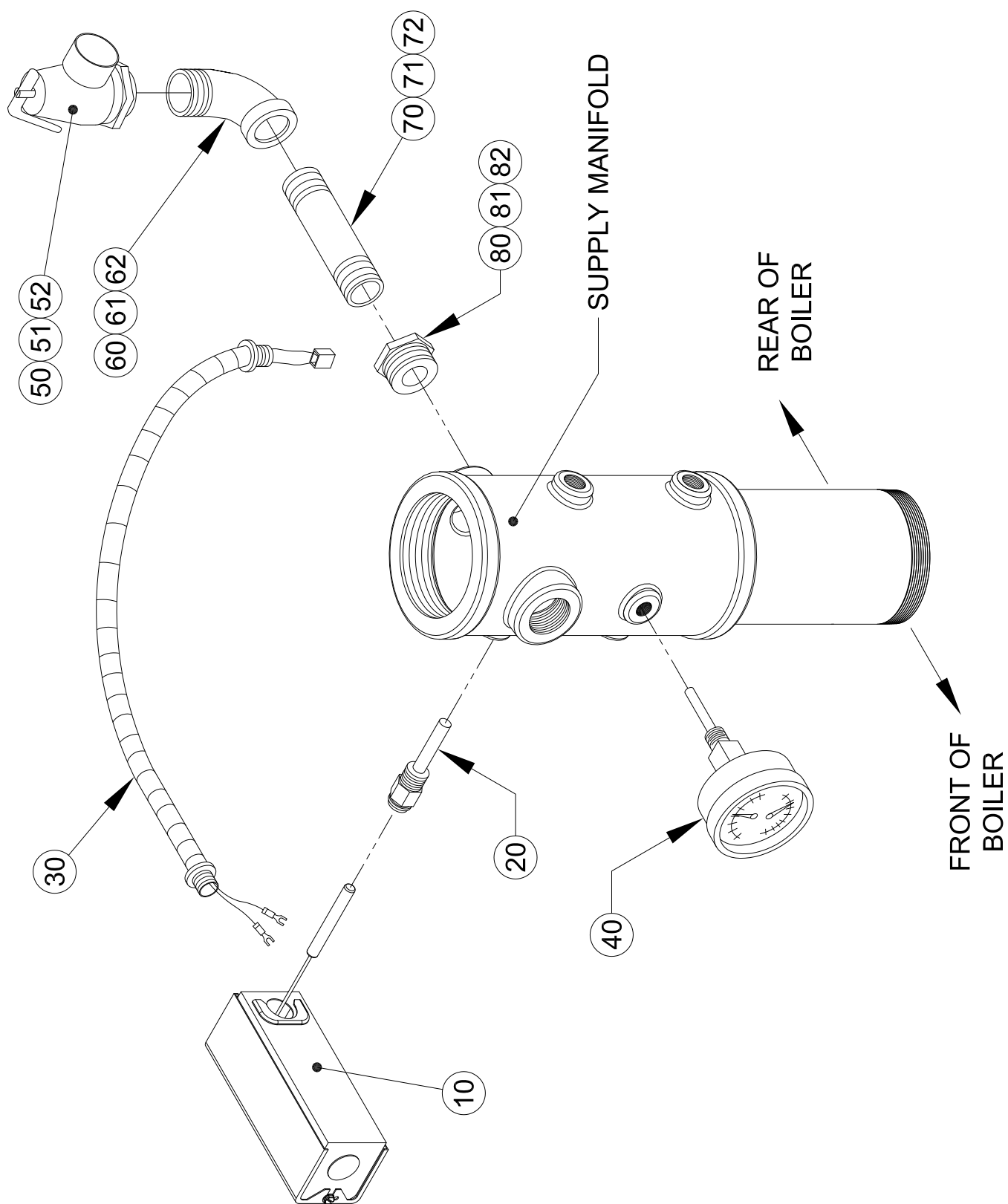


Figure 64: MPC Standard 50 PSI Trim and Control with 30 PSI and 80 PSI Working Pressure Trim Options (continued)

REPAIR PARTS - STANDARD WATER TRIM & CONTROL AND OPTIONAL WORKING PRESSURE TRIM (continued)

Item No.	Description	Boiler Sections / Quantity																		Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18				
OPTIONAL WORKING PRESSURE TRIM:																				
51	Relief Valve, 30 PSI:																			
	51A. Conbraco #10-614-05, 3/4" x 1"	1	1	1													81660337			
	51B. Conbraco #10-615-05, 1" x 1 1/4"			1	1	1	1										81660338			
	51C. Conbraco #10-616-05, 1 1/4" x 1 1/2"						1	1	1	1	1	1	1	1			81660334			
	51D. Conbraco #10-617-05, 1 1/2 x 2"														1	1	81660335			
61	Street Elbow, Black Malleable:																			
	61A. 3/4" x 90°	1	1	1													806601501			
	61B. 1" x 90°				1	1	1										806601514			
	61C. 1 1/4" x 90°						1	1	1	1	1	1	1	1			806601516			
	61D. 1 1/2" x 90°														1	1	806601517			
71	Nipple, SCH.40, Black																			
	71A. 3/4" x 3 1/2" Lg.	1	1	1													806600038			
	71B. 1" x 4" Lg.				1	1	1										806600026			
	71C. 1 1/4" x 4" Lg.						1	1	1	1	1	1	1	1			806600028			
	71D. 1 1/2" x 4 1/2" Lg.														1	1	806600016			
81	Reducing Bushing, Black Malleable:																			
	81A. 1 1/2" x 3/4"	1	1	1													806600507			
	81B. 1 1/2" x 1"				1	1	1										806600521			
	81C. 1 1/2" x 1 1/4"						1	1	1	1	1	1	1	1			806600539			
52	Relief Valve, 80 PSI:																			
	52A. Conbraco #10-614-16, 3/4" x 1"	1	1	1	1	1	1	1	1	1							81660365			
	52B. Conbraco #10-615-16, 1" x 1 1/4"										1	1	1	1	1	1	81660366			
62	Street Elbow, Black Malleable:																			
	62A. 3/4" x 90°	1	1	1	1	1	1	1	1	1							806601501			
	62B. 1" x 90°										1	1	1	1	1	1	806601514			
72	Nipple, SCH.40, Black:																			
	72A. 3/4" x 3 1/2" Lg.	1	1	1	1	1	1	1	1	1							806600038			
	72B. 1" x 4" Lg.										1	1	1	1	1	1	806600026			
82	Reducing Bushing, Black Malleable:																			
	82A. 1 1/2" x 3/4"	1	1	1	1	1	1	1	1	1							806600507			
	82B. 1 1/2" x 1"										1	1	1	1	1	1	806600521			

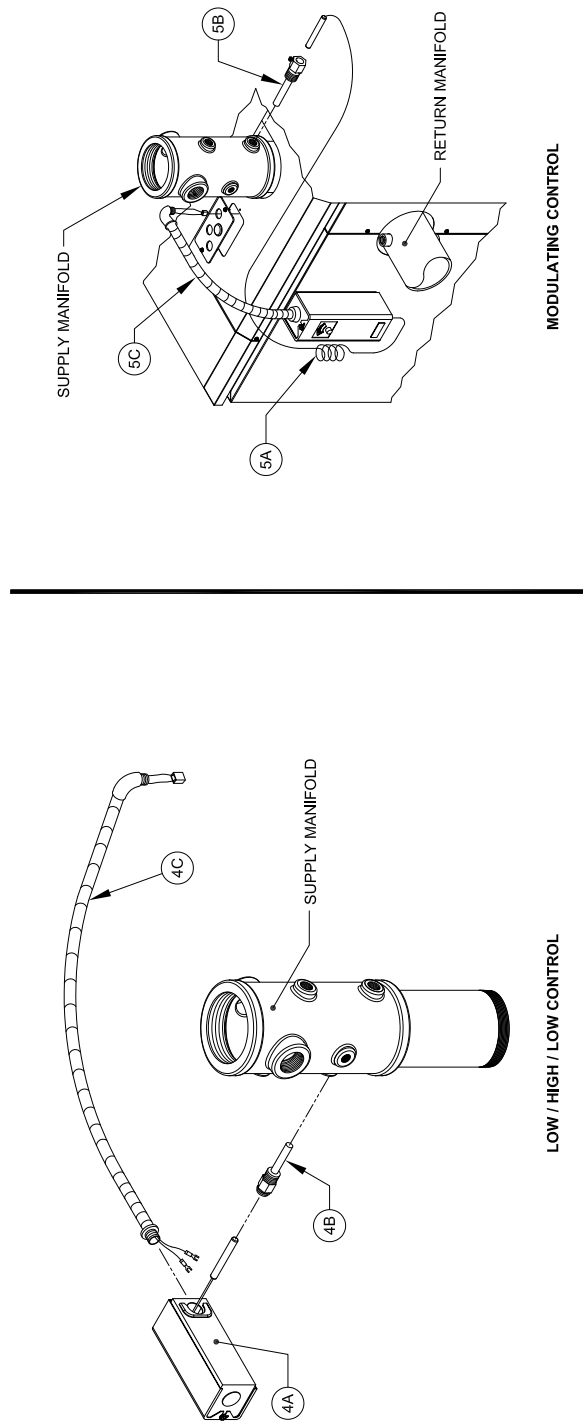
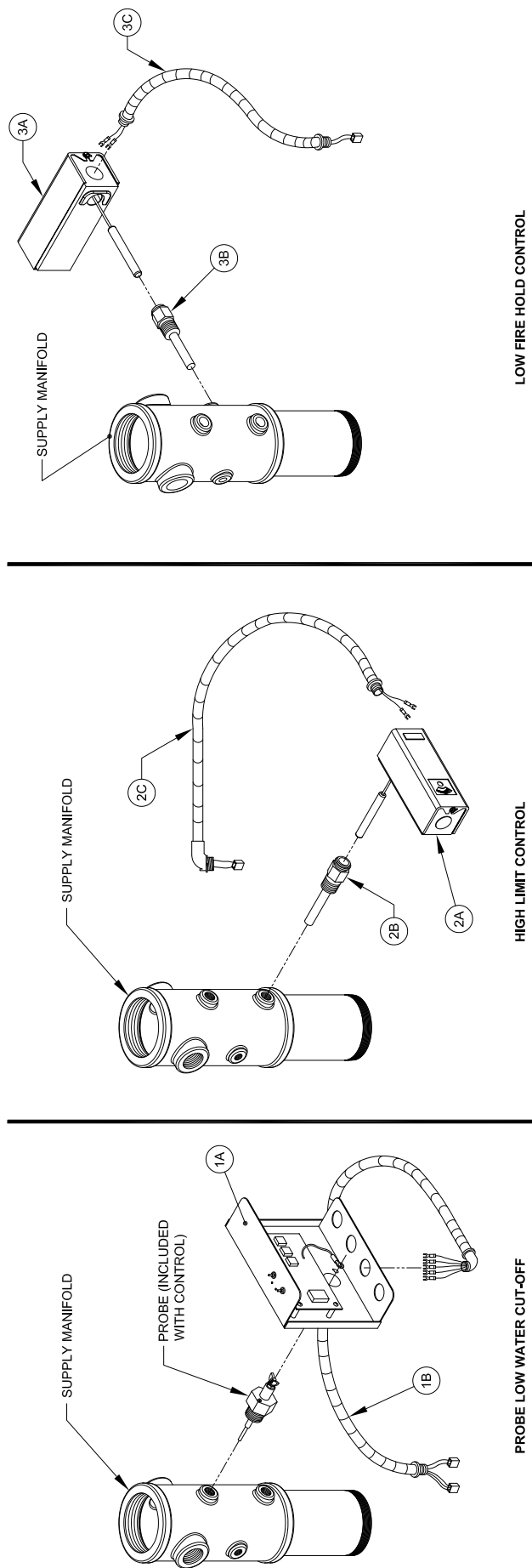


Figure 65: MPC Optional Controls

REPAIR PARTS - COMMON OPTIONAL CONTROLS

Item No.	Description	Boiler Sections / Quantity																	Part No.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18			
1	Probe Low Water Cut-Off:																		
	1A. LWCO, McDonnell & Miller 750 P-MT-120 w/Probe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160718	
	1B. Wiring Harness, LWCO to J-Box	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101398-01	
2	Limit, High Limit Control:																		
	2A. Limit, Honeywell L4006E1133	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160703	
	2B. Immersion Well, Honeywell 123871A, ¾" NPT x 3" Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160452	
3	2C. Wiring Harness, High Limit to J-Box	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101388-01	
	Low Fire Hold Control:																		
	3A. Limit, Honeywell L4006B1189	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160656	
4	3B. Immersion Well, Honeywell 123872A, ½" NPT x 3" Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160497	
	3C. Wiring Harness, LFH Control to J-Box	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101386-01	
	Low / High / Low Control:																		
5	4A. Limit, Honeywell L4006A2015	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160400	
	4B. Immersion Well, Honeywell 123871A, ¾" NPT x 3" Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160452	
	4C. Wiring Harness, LHL Control to J-Box	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101389-01	
5	Modulation Control:																		
	5A. Honeywell T991A1061	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160458	
	5B. Immersion Well, Honeywell 112630AA, ¾" NPT x 1" Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80160459	
	5C. Wiring Harness, Mod. Control to J-Box	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	101387-01	

Appendix A - Figures

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Figure 14	30	Orientation of Return Manifold
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Limited Warranty

For Commercial Grade Boilers

Using Cast Iron, Carbon Steel,
or Stainless Steel Heat Exchangers
and Parts/Accessories

Subject to the terms and conditions set forth below, Burnham Commercial, Lancaster, Pennsylvania hereby extends the following limited warranties to the original owner of a commercial grade water or steam boiler or Burnham Commercial supplied parts and/or accessories manufactured and shipped on or after October 1, 2009:

ONE YEAR LIMITED WARRANTY ON COMMERCIAL GRADE BOILERS AND PARTS / ACCESSORIES SUPPLIED BY BURNHAM COMMERCIAL.

Burnham Commercial warrants to the original owner that its commercial grade water and steam boilers and parts/accessories comply at the time of manufacture with recognized hydronic industry standards and requirements then in effect and will be free of defects in material and workmanship under normal usage for a period of one year from the date of original installation. If any part of a commercial grade boiler or any part or accessory provided by Burnham Commercial is found to be defective in material or workmanship during this one year period, Burnham Commercial will, at its option, repair or replace the defective part (not including labor).

HEAT EXCHANGER WARRANTIES

Burnham Commercial warrants to the original owner that the heat exchanger of its commercial grade boilers will remain free from defects in material and workmanship under normal usage for the time period specified in the chart below to the original owner at the original place of installation. If a claim is made under this warranty during the "No Charge" period from the date of original installation, Burnham Commercial will, at its option, repair or replace the heat exchanger (not including labor). If a claim is made under this warranty after the expiration of the "No Charge" period from the date of original installation, Burnham Commercial will, at its option and upon payment of the pro-rated service charge set forth below, repair or replace the heat exchanger. The service charge applicable to a heat exchanger warranty claim is based upon the number of years the heat exchanger has been in service and will be determined as a percentage of the retail price of the heat exchanger model involved at the time the warranty claim is made as follows:

Years in Service	Service Charge as a % of Retail Price									
	1	2	3	4	5	6	7	8	9	10+
Cast Iron	No Charge									100
Carbon Steel	No Charge	100								
Stainless Steel	No Charge					20	40	60	80	100

NOTE: If the heat exchanger involved is no longer available due to product obsolescence or redesign, the value used to establish the retail price will be the published price as set forth in Burnham Commercial Repair Parts Pricing where the heat exchanger last appeared or the current retail price of the then nearest equivalent heat exchanger, whichever is greater.

ADDITIONAL TERMS AND CONDITIONS

1. Applicability: The limited warranties set forth above are extended only to the original owner at the original place of installation within the United States and Canada. These warranties are applicable only to boilers, parts, or accessories designated as commercial grade by Burnham Commercial and installed and used exclusively for purposes of commercial space heating or domestic hot water generation through a heat exchanger (or a combination for such purposes) and do not apply to residential grade products or industrial uses.
2. Components Manufactured by Others: Upon expiration of the one year limited warranty on commercial grade boilers, all boiler components other than heat exchangers manufactured by others but furnished by Burnham Commercial (such as oil burner, circulator and controls) will be subject only to the manufacturer's warranty, if any.
3. Proper Installation: The warranties extended by Burnham Commercial are conditioned upon the installation of the commercial grade boiler, parts, and accessories in strict compliance with Burnham Commercial installation instructions. Burnham Commercial specifically disclaims liability of any kind caused by or relating to improper installation.
4. Proper Use and Maintenance: The warranties extended by Burnham Commercial conditioned upon the use of the commercial grade boiler, parts, and accessories for its intended purposes and its maintenance accordance with Burnham Commercial recommendations and hydronics industry standards. For proper installation, use, and maintenance, see all applicable sections of the Installation and Operating, and Service Instructions Manual furnished with the unit.
5. This warranty does not cover the following:
 - a. Expenses for removal or reinstallation. The owner will be responsible for the cost of removing and reinstalling the alleged defective part or its replacement and all labor and material connected therewith, and transportation to and from Burnham Commercial.
 - b. Components that are part of the heating system but were not furnished by Burnham Commercial as part of the commercial boiler.
 - c. Improper burner adjustment, control settings, care or maintenance.
 - d. This warranty cannot be considered as a guarantee of workmanship of an installer connected with the installation of the Burnham Commercial boiler, or as imposing on Burnham Commercial liability of any nature for unsatisfactory performance as a result of faulty workmanship in the installation, which liability is expressly disclaimed.

- e. Boilers, parts, or accessories installed outside the 48 contiguous United States, the State of Alaska and Canada.
 - f. Damage to the boiler and/or property due to installation or operation of the boiler that is not in accordance with the boiler installation and operating instruction manual.
 - g. Any damage or failure of the boiler resulting from hard water, scale buildup or corrosion the heat exchanger.
 - h. Any damage caused by improper fuels, fuel additives or contaminated combustion air that may cause fireside corrosion and/or clogging of the burner or heat exchanger.
 - i. Any damage resulting from combustion air contaminated with particulate which cause clogging of the burner or combustion chamber including but not limited to sheetrock or plasterboard particles, dirt, and dust particulate.
 - j. Any damage, defects or malfunctions resulting from improper operation, maintenance, misuse, abuse, accident, negligence including but not limited to operation with insufficient water flow, improper water level, improper water chemistry, or damage from freezing.
 - k. Any damage caused by water side clogging due to dirty systems or corrosion products from the system.
 - l. Any damage resulting from natural disaster.
 - m. Damage or malfunction due to the lack of required maintenance outlined in the Installation and Operating Manuals furnished with the unit.
6. Exclusive Remedy: Burnham Commercial obligation for any breach of these warranties is limited to the repair or replacement of its parts (not including labor) in accordance with the terms and conditions of these warranties.
 7. Limitation of Damages: Under no circumstances shall Burnham Commercial be liable for incidental, indirect, special or consequential damages of any kind whatsoever under these warranties, including, but not limited to, injury or damage to persons or property and damages for loss of use, inconvenience or loss of time. Burnham Commercial liability under these warranties shall under no circumstances exceed the purchase price paid by the owner for the commercial grade boiler involved. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
 8. Limitation of Warranties: These warranties set forth the entire obligation of Burnham Commercial with respect to any defect in a commercial grade boiler, parts, or accessories and Burnham Commercial shall have no express obligations, responsibilities or liabilities of any kind whatsoever other than those set forth herein. These warranties are given in lieu of all other express warranties.

ALL APPLICABLE IMPLIED WARRANTIES, IF ANY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED IN DURATION TO A PERIOD OF ONE YEAR EXCEPT THAT IMPLIED WARRANTIES, IF ANY, APPLICABLE TO THE HEAT EXCHANGER IN A COMMERCIAL GRADE BOILER SHALL EXTEND TO THE ORIGINAL OWNER FOR THE TIME SPECIFIED IN THE HEAT EXCHANGER SECTION SHOWN ABOVE AT THE ORIGINAL PLACE OF INSTALLATION. SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

PROCEDURE FOR OBTAINING WARRANTY SERVICE

In order to assure prompt warranty service, the owner is requested to complete and mail the Warranty Card provided with the product or register product online at www.burnhamcommercialcastiron.com within ten days after the installation of the boiler, although failure to comply with this request will not void the owner's rights under these warranties. Upon discovery of a condition believed to be related to a defect in material or workmanship covered by these warranties, the owner should notify the installer, who will in turn notify the distributor. If this action is not possible or does not produce a prompt response, the owner should write to Burnham Commercial, P.O. Box 3939, Lancaster, PA 17604, giving full particulars in support of the claim. The owner is required to make available for inspection by Burnham Commercial or its representative the parts claimed to be defective and, if requested by Burnham Commercial to ship these parts prepaid to Burnham Commercial at the above address for inspection or repair. In addition, the owner agrees to make all reasonable efforts to settle any disagreement arising in connection with a claim before resorting to legal remedies in the courts.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

